THE FAR EASTERN REVIEW

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遠東時報

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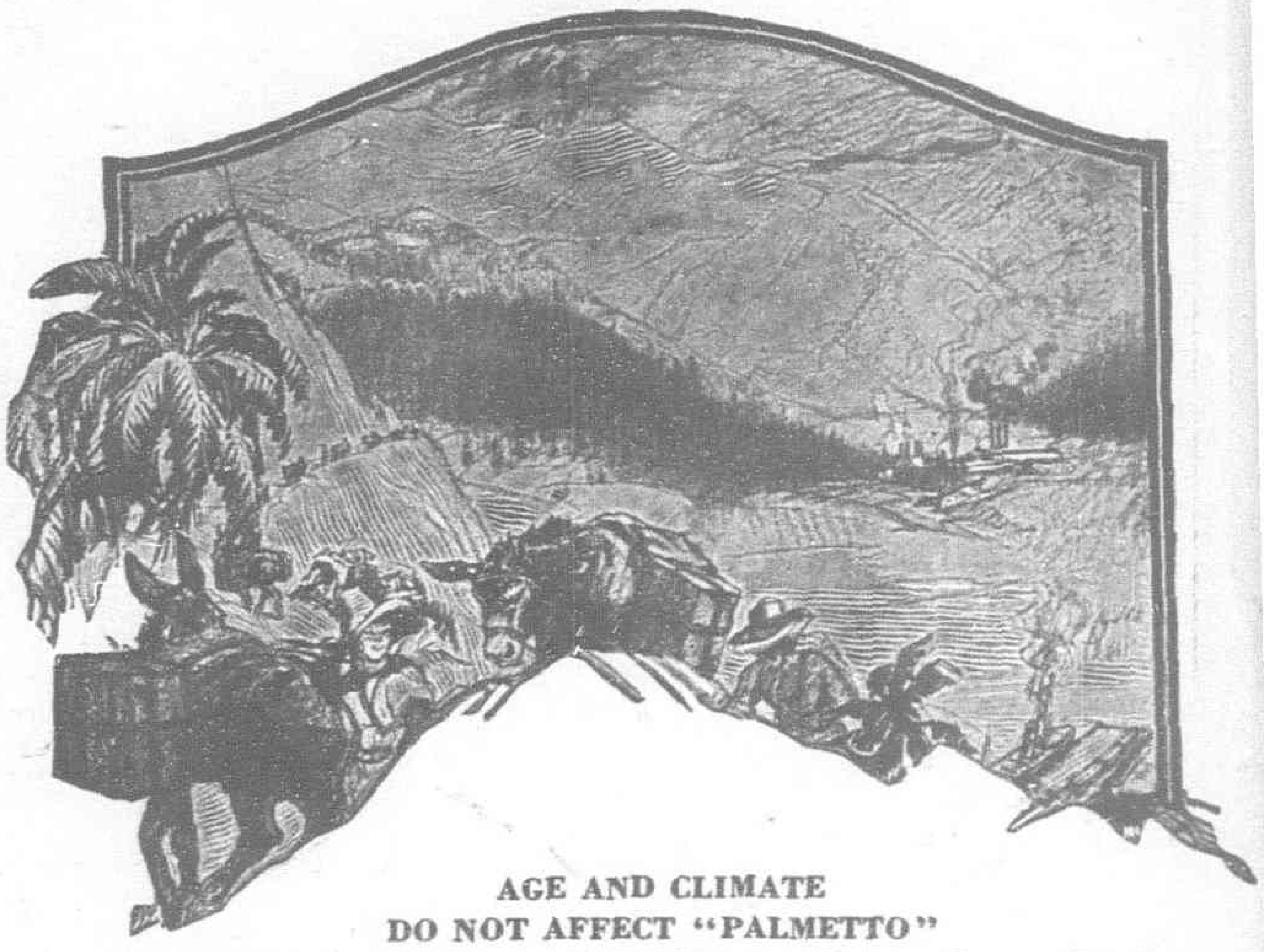

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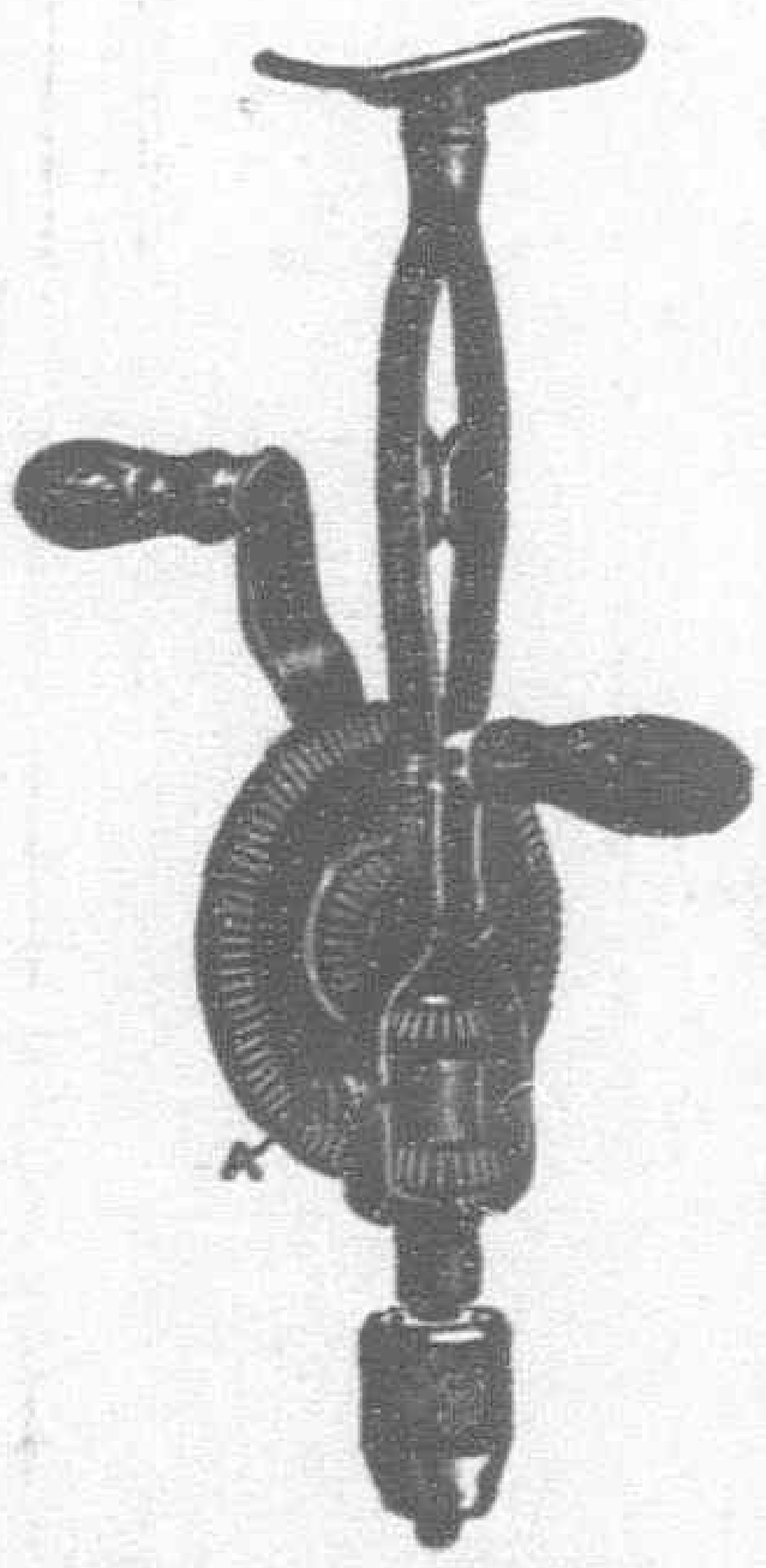

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The Far Eastern Review

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Stand by China

An Address by Mr. George Bronson Rea, Delivered before the English Club of The Higher Commercial School, Tokyo, on April 29, 1925.

I HAVE been asked to say a few works about China. It is rather a big subject covering many phases and angles, all interesting and important and all having a great bearing on the future of Japan. The future of your country politically and economically is bound up in the future of China. If China goes under and fails to establish a strong central authority it will have a very disastrous effect on the future of Japan and complicate the problems already confronting your people and government. The best interests of Japan are therefore best served by the establishment of a stable government in China, no matter what the political completion of such a government may be, whether it be one headed by the present chief executive, Tuan Chi-jui, or by any of the other military or political chieftains. For, on the establishment of a stable and unified government bringing internal peace and the enforcement of law and order throughout that vast domain, hinges the future development and prosperity of the Chinese people, and on their prosperity and ability to purchase from abroad, hinges the future economic existence of Japan.

You may sell your silk to America, you may distribute your chinaware,your piece goods and toys throughout the other countries of the world, but in the final analysis, the vast majority of your other manufactured products must find an outlet in the land of your nearest neighbor. If Japan is to succeed as an industrial nation she must reverse the present unfavorable balance of trade by increased exports and the only market that is open to you for real development and expansion lies in China. To accomplish this, there must be a ground work of friendship and sympathy between the two peoples. There must be a complete understanding as to each others problems and aspirations and on the part of Japan everything possible must be done to wipe out the old anti-Japanese feeling and bring to the people of China the realization that Japan is their friend. Fortunately, much has been accomplished along these lines. Your business men and government have laid the foundation of this friendship by a policy which leaves nothing to be desired. As a result of this new program, it may be said that public opinion in China, especially amongst the intelligent classes is for the first time in twenty years not unfriendly towards Japan. It has not been an easy matter to overcome the deep rooted suspicion and hatred of Japan which permeated all classes of Chinese society, but a consistent, honorable and broad-minded attitude on the part of your statesmen has finally convinced the thinking Chinese of your sincerity. On this foundation you must build. On this foundation lies your one hope of success in the struggle for existence. On the friendship of the 400,000,000 Chinese people depends your ability to survive as an industrial nation. Lose that friendship and as time passes, you will pay the penalty.

The United States bases great hopes on the future expansion of its trade with China but American capital has done nothing as yet to advance that trade by furnishing capital for developing the resources of that country. Great Britain also looks to the markets of China to consume many of her manufactured products and has contributed many millions of pounds for the development of its industries and railways. In fact, it may be said that outside of Manchuria, British capital has been the principal instrument in the building up of China's railway system and the development of its trade possibilities. American, British, French, Russian and other foreign interests may enjoy a very definite position in China, but far above them all, are the interests of Japan whose investments in that country are now valued at roughly Y.5,000,000,000.

Japan's Economic Interests

Manchuria has been the special field for Japanese activities and here it is estimated that the present value of your investments will reach nearly Y.3,000,000,000 of which about one half is represented by the properties owned or controlled by the South Manchuria Railway Company, Japanese capital now owns outright about 40 per cent. of the total splindlage in China's cotton mills and with the advances made by your banks to Chinese mill owners, it is possible that the extent of your interest in this one industry will reach nearly sixty per cent. Your bankers have advanced nearly Y.45,000,000 to the premier iron and coal enterprise of China, (the Han Yeh Ping Coal and Iron Company) while other millions have been invested in property and minor industrial undertakings which give you the premier position in the development of the country. When you add to all this, Japan's interest in the Shantung Railway and mines, the loans to the Chinese Government which have built the Kirin, the Ssupingkai-Taonan Railway and now the extension of the latter line towards Tsitsihar, the loans to the provincial Kiangsi Railway Company and the loans of the Yokohama Specie Bank to the Ministry of Communications, you will begin to realize something of the immense stake Japan has in the peaceful and uninterrupted development of China, a stake which places your country in a position where at all costs, without sacrifice of national honor, you are obligated to play the game fairly and squarely with the Chinese.

China's Laborers

In many respects you are in a very vulnerable position by reason of some of these investments, especially in the textile industry. China is passing through a transition stage in which the workers are being organized under the political wing of the Kuomintang party and instigated to strikes and disorders by the propaganda of the Soviet. The only manufacturing industries in China in which the workers are engaged in sufficient numbers to justify organization are the cotton mills. Hence, in any movement for the bettering the living conditions of the factory workers, the textile industry would be the first point of attack. This will help to explain something of the motives underlying the strike of the Chinese operatives in the Japanese owned cotton mills of Shanghai, which has now spread to Tsingtao. When, to the grievances of the workers—whether justified or not—is added the dormant anti-Japanese feeling which has not died out amongst the lower classes, you will begin to understand how delicate is the position of Japanese capital invested in such enterprises. It is for this reason, that the Japanese must make every effort to understand the psychology of the Chinese workmen and win their sympathy by equitable treatment and betterment of their living conditions.

It will be difficult during the next few years of political evolution and increasing labor troubles completely to eliminate these factors which make for bad-feeling and national hatreds, but there is every evidence that the Japanese government and your capitalists interested in China have fully grasped the significance of the new movement and are taking every honorable and fair measure to meet the wishes of the Chinese workers. It is not my purpose to stress this situation except to use it as an added argument to strengthen the statement that the future of Japan in China must be based on a thorough and complete understanding of the forces operating to change the outlook of the Chinese in the same way that similar forces are working in Japan to evolve a new cultural and political structure out of your old ideals and traditions. Japan herself is passing through a period of transition adapting and adopting the best that the civilization of the west has to offer her and she is still far from perfection. Much remains for Japan to accomplish before she attains a firm industrial and commercial position in the struggle for existence and there are still political storms looming on the horizon which you must face and weather.

You must remember that China is now navigating through uncharted political seas practically without guidance. No captain has come forward to grasp the wheel and steer the ship of state clear of the rocks. When the old Manchu regime was swept away in the revolution of 1911, there was nothing to take its place. The republic has been a failure but there is little doubt that left to themselves the Chinese people will evolve some suitable form of government that will meet their own peculiar ideals of what a government should be. The China of to-day is not the China of ten years go, nay, of even five years ago. In the same way that the Japan of to-day faces the future with a different outlook that it did three years ago, so the viewpoint of the Chinese people is changing, and it is vital to the future of Japan that during these years of travail and stress through which the Chinese must pass that they be assured of your friendly and sympathetic aid in the event that their unmanageable craft drifts on the rocks and is handed over to an international salvage organization. I do not mean to convey by this that any foreign nation is seriously hoping for the break-up of China. That is, to use American slang, " old stuff." The nations of the world have outgrown the old ideas of twenty years ago and at the Washington Conference, China was presented with a bill of rights which firmly establishes her position in the family of nations. There is no government, signatory to the Nine Power Treaty which does not honestly and sincerely hope that China will be able to surmount her difficulties. On the other hand, these expectations may not be realized and the day may arrive, if present conditions endure, when China will lay a hopeless wreck inviting foreign intervention and the imposition of new infringements on her administrative rights in order to satisfy her creditors.

Friendship and Sympathy

This then is the danger to China that calls for the sympathy and aid of Japan, for it goes without saying that if China's administrative independence be further impaired and the day of the full restoration of her sovereign rights postponed for another long term of years, it will react on the position and prestige of Japan. It is fortunate that you have at the head of your Ministry of Foreign Affairs a statesman who has visualized what all this means to the future of your country and whose perfect command of English enabled him to lay down in no uncertain words the firm determination of his government to oppose any plan which might in any way bring China's administrative bureaus under international control. I am convinced that this friendly message carried to the Chinese people at this time of great national uncertainty when others are openly advocating further foreign control over their administrative bureaus, has contributed to a new conception amongst the thinking men of that country as to Japan's real aims and policies.

However, diplomacy and the utterances of statesmen carry little weight unless backed up by the full force of public opinion, and here again, it is gratifying to be able to state that these friendly opinions do represent the thought of the masses of Japan. These thoughts however, must be expressed in actions. Actions speak louder than words and it is not alone the actions of your government which will cement this friendly feeling with China but the attitude of the private individual in dealing with the Chinese. It devolves upon the men, who, like yourselves, will carry the brunt of Japan's future trade activities in China to make this policy a success. When you realize all that this means to the future industrial greatness of your country, upon which depends your ability to survive in the grim struggle for existence that each year becomes more intense, you will understand and take to heart that the first and loftiest obligation of every Japanese is to stand by China, with sympathy and forbearance, with tolerance and hope and with all your resources. This is the message that I, an American, bring to you young men starting on your commercial career.

Is the Oriental Valuable to the Pacific Coast?

An Impartial Survey into Conditions

A CANADIAN-AMERICAN study of the Oriental on the Pacific Coast has been made by the Survey of Race Relations which were presented at a conference at Stanford University which met between March 21 to 26, 1925. The survey was made under the direction of a group of professors and social workers who are experts in this particular field. The purpose of this survey has been to discover and interpret some of the chief facts about relations between Orientals and Occidentals on the Pacific Coast. " There has been no intention of formulating policies or programs. In making this study, every precaution has been taken to avoid bias. The committees directing the Survey have included men and women differing widely in their viewpoints on racial matters, but agreed upon the importance of ascertaining and making available the information, impartially and critically secured, so that there would be no excuse for quoting two sets of alleged facts with regard to any aspect of race relations covered by the study."

A study is made of population and vital statistics, which show that the Japanese population has been increasing but at a decreasing rate of increase since 1890. The ratio of the Chinese and Japanese to the total population in California has been steadily declining since 1900. In 1920, this ratio was 2.9 ; while in 1900, two decades previously, it was 3.8. However, in some counties in California the ratios of the Chinese and of the Japanese to the total population are considerably in excess of this percentage. Thus in San Joaquin County, the per cent. of Chinese and Japanese to the total population was 7.7 ; while in Yuba County this percentage was 34.5.

The frequently quoted birth rates of the Japanese are high because they are extremely crude. They do not take into account the fact that the Japanese are the youngest age group in California and that a very large number of women of marriageable age have come into the state since 1907. Moreover, these crude birth rates are based upon an estimate of Japanese population which undoubtedly is smaller than the actual number. An analysis of the official statistics of the California State Bureau of Vital Statistics shows that the birth rate of the Japanese is very nearly the same as the birth rate of the white population of the state. In 1922, the average issue per white *mother* was 2.63, the average issue per Japanese *mother* was 2.83, and the average issue per Chinese *mother* was 3.26.

The facts show that the reason for the apparent high birth rate among the Japanese is that few Japanese marriages are childless. Thus, in the white population of California, the number of married women per birth in 1922 was 8.0; while among the Japanese in the same year the number of married women per birth was 3.2, and among the Chinese, 1.6. Again, the number of births per one thousand *married* women of child-bearing age among the white population of California was 125.5, among the Japanese, 317.2, among the Chinese, 621.1.

This apparent discrepancy is due, among other things, to the fact that there is a high percentage of childless marriages in the native population, and to the more youthful ages of Japanese men and women.

5. Available and reliable corroborative statistical data indicate that somewhat over one-third of the Japanese population in California are native-born Americans.

The Chinese have gone through a process of urbanization, leaving the farm areas and settling in the cities where they become merchants.

Vocationally there has been a clear tendency on the part of the Chinese to withdraw from the competitive forms of labor and business and to enter less productive urban callings. In some of the cities, notably in border and seacoast communities, there is a pronounced tendency for an increasing number of Chinese to engage in lotteries and other disorganizing callings.

Prior to the passing of our anti-alien land legislation the Japanese had shown a distinct movement toward concentration in the small fruit and vegetable agricultural areas in British Columbia and the three American States. They had withdrawn gradually from those sections where the use of expensive and heavy machinery had been increasingly practiced. For instance, practically every wheat-growing county in the State of Washington shows a decrease in Japanese population during the past decade. On the other hand, King and Pierce counties, where the cities of Seattle and Tacoma are located, have shown marked increases in that population during this same period.

Unlike the Chinese, the Japanese, prior to the passing of the anti-alien land laws, had shown no marked tendency toward urbanization. They were the least urbanized immigrant group in the country.

Social conditions among the Chinese and Japanese lead to the interesting conclusions that they are law-abiding and healthy and of little expense to the community.

"1. The Survey has sought to investigate and discover the differing tendencies among the different Oriental peoples to social disorganization in crime; and particularly, to investigate the value of the organizations which the different Oriental communities have created to meet the difficulties and exigencies of American life.

2. The Oriental, apparently, has been of very little expense to the American community. Such records of relief agencies as have been studied indicate that the amount of relief given is very small. The extent of poverty, delinquency, and crime—insofar as dealt with by American agencies—is slight.

3. It appears that the organization of the Oriental communities, in every case, has grown up out of the necessity of meeting the strains of life under American conditions. Their organized groups have rendered a service, not only in imposing a discipline upon the members of the Oriental community but in protecting them from conflict with the larger white community outside. This has been apparently, and in the first instance, the origin of both the Chinese Six Companies and the Japanese Associations.

4. All the more intelligent immigrant groups, when subjected to prejudice, have set up similar institutions and organizations. An investigation relative to pauperism among immigrants, made by the United States Immigration Commission in 43 cities, covering the years 1850-1908 inclusive, showed that the proportion of native-born who received aid was very much greater than that of foreign-born. This was especially true of the more recent immigrants to the United States from southern and southeastern Europe, against whom there has been noticeable prejudice.

A study of the health of Orientals shows that, compared with 16 per cent. of the white population, only 6 per cent. of the Chinese and Japanese population suffer from nervous diseases. Although Orientals are rarely affected with circulatory diseases, the Chinese and Japanese are far more susceptible than white people to epidemic diseases."

Agriculture

Because of differences in soil, climate, seasons, tenancy, and in the nature of farm merchandise, no generalizations are possible regarding most agricultural products raised on the Pacific Coast. The farming situation in Victoria or Vancouver cannot be readily compared with conditions in the three Pacific Coast States. Even within the single State of California, a careful differentiation must be made between the rice fields, the orchards in the foothill counties, the berry regions, the metropolitan trucking and fruit districts, and the reclaimed lands of the desert. The problem of water is of cardinal importance, since the best agricultural lands are irrigated; and it is in these sections that the Orientals have been large productive elements.

Arid lands present not-to-be-neglected considerations which require a high degree of science and technology in order to use but not "mine" the soil, to provide a careful utilization of the available water supply so that the person on the end of the ditch will not suffer, and to administer natural resources for the common good. Water is the great limiting factor in the Pacific Coast agriculture. The great lesson of the desert is that every farm worker must sacrifice his personal independence for the community welfare. Into this carefully organized and disciplined system the Japanese, unlike the native white, can make immediate adjustment. If proper account is taken both of the natural tendency of the Japanese to associate a plentiful application of water with good farm management, and of the soil wastage process under a one to three-year lease, then these Oriental people are entitled to an especially high rank as agricultural producers.

Great changes have taken place in the racial composition of agricultral labor. Forty years ago over half the farm laborers in California were Chinese; while to-day very few of that race are left in agriculture. In British Columbia the Chinese are the great market gardeners and supply the majority of the vegetables grown in that province. In California the Japanese have risen so rapidly from the status of laborer to tenant that at the present time they are no longer available as a large laboring class but are themselves important employers of Mexicans in Imperial Valley.

With the disappearance of the Chinese from agriculture and with the decrease of Japanese in this work, the question arises: who is to do the manual work? From all indications it appears that at least for some years to come the Mexicans will be used more and more, with the Filipinos and Porto Ricans as later and less important groups. The East Indians and the negroes specialize in cotton.

The so-called white labor in California is, to a large extent, made up of alien peoples, notably Italians, Portuguese, Swiss, Scandinavians, and Armenians. The real economic competition in agriculture is not so much between the descendants of the white pioneers and the Orientals as it is between the later European immigrants and the Orientals. A five-months' firsthand survey in the Great Valley of California brings increasing testimony that the sons of white farmers of pioneer and later stock are leaving agriculture for business and the professions.

Most California farmers expect the future labor supply to be furnished mainly by Mexican migratory workers. Many large ranchers, who are recognized locally and nationally as worthy citizens, are seriously advancing the proposal to bring in Chinese indenture labor on a ten-year basis, men only to be admitted, in order to clear and develop lands which cannot profitably be worked without a plentiful supply of cheap labor. This proposal has its recognized, objectionable features and would require special legislation; yet it is presented here because it is being seriously entertained in a quiet fashion. A third alternative is the selection of settlers from other parts of the United States.

In California the high price of land in many sections, justified by economic, social, and climatic factors, is a deterrent element to any widespread influx of farm population. Few of the migrants from the Middle West continue as farmers. Moreover, the seasonal aspects bring about a migratory class, formerly hoboes and Orientals, but now largely Mexicans. Living conditions on the ranch or farm are in many cases unsuited to most white labor. Therefore, the supplanting of Mexican and much of the Oriental labor would require investment in living accommodations which present owners are unable or unwilling to furnish.

In the United States the Japanese are in demand as tenants and foremen because they are willing to work during all hours, their women are frequently field workers, they are willing to engage in intensive hand labor which does not appeal to the white man, and they are reliable. Because of their dependability and frugal habits, many bankers and distributors consider them superior risks; thus frequently they are enabled to borrow money easier or at a lower rate of interest. Many employers object to the Japanese because they are not contented to remain as laborers at a low wage. As a rule the Oriental receives as high or higher compensation than the other races and they tend to become good spenders. A director of a great national farmers' organization states, "The Oriental is a commodity. He is not cheap labor, but he finishes his job." This verdict is representative.

Had there been no Alien Land Law, the Japanese would probably have acquired a great deal of rural property and as fast as they could; but, in the meantime, aliens ineligible to American citizenship would have enjoyed merely a tenant status. There is evidence already that this legislation is driving many Japanese growers off the land into the business occupations of the city; yet another change is that landowners, unwilling to see their property lie fallow, are selling outright to Japanese minors. This is producing a situation which, in the opinion of thoughtful California pioneers, is apt to mean that after a decade or so, large acreage will pass into the hands of second generation Orientals who will become capitalists, creating thereby another distinct problem. In enacting similar legislation, most Pacific and Western States are stumbling into an intricate situation which they have not taken pains to figure out.

To develop the rich agricultural lands along the Pacific Coast, more agricultural workers are necessary. In the sense that Orientals shall continue to be required because they do work that no others can perform, it is true that they are prone to engage in industries or types of labor not attractive to other elements; at the same time, under fair working conditions, non-Asiatics can perform every task undertaken now by Chinese, East Indians, or Japanese.

Second Generation

1. There are in the United States several thousand native-born Japanese and Chinese boys and girls who are American citizens. The Japanese are such comparatively recent arrivals that very few of their American-born children are in college or in the professions as yet. Native Americans have hardly become aware of their existence.

2. The American-born presents the most interesting and fascinating problem of any racial group. All the evidence goes to show that the native-born Oriental tends to acquire naturally and inevitably all the external mannerisms, sentiments, personal characteristics, and loyalties of the American community in which he grows up. This takes place frequently in the case of the Oriental in spite of the most strenuous efforts on the part of the older generation, particularly true of the Chinese, to preserve the Oriental tradition.

3. The Japanese are very eager to give their children an education—if possible to send them to college. The Chinese are apparently not so eager to send their children to school solely for the sake of an education. They wish to fit them for some occupation or career where they can earn a living. In many cases, when the Chinese cannot establish their children in businesses in this country, they send them beck to China to be educated."

The Survey is only a preliminary one and its report warns against drawing conclusions therefrom. Nevertheless, it is interesting to note from the report that much of the anti-Japanese propaganda on the Pacific Coast is obviously untrue and is designed to mislead Americans in other parts of the United States as to conditions in California and other Western States. It would be well for the Survey to consider another phase of the question:

The United States is apparently making every effort to win the good-will of the people of China and Japan. Every American agency in the Far East is doing everything humanly possible to achieve this end. At the same time and paradoxically, the American Congress passes legislation forbidding the people of these countries to enter the United States except under certain umbrageous stipulations. The Chinese and Japanese are proud people, easily offended and long suffering. Nothing can possibly hurt them more than to be regarded as inferior races. During the past century, since Chinese and Japanese have been visiting Europe and America, they have come to know that much of the talk of their inferiority is not based upon fact. Even admitting that certain western nations like the United States and Great Britain have developed a superior mechanical technique and a more efficient governmental system, they know that others are far behind them in these phases of life as well as in the cultural expressions of human civilization. To place the Chinese and the Japanese below the American and Servian, for instance, in the scale of human development is as baseless as it is unfair. It hurts the sentiments of the Chinese and Japanese. It hurts the position of the Americans in China and Japan.

Discrimination Unfair and Unchristianlike

Colonel Birch Helms, American Banker, Says Have Faith in the United States

War Talk Misleading

COLONEL Birch Helms, a member of Blair & Company, New York Bankers and Deputy Director of the Military Intelligence Division of the United States during the War, delivered an address before the Pan-Pacific Club in Tokyo, which he has been visiting after a trip to Australia in the interesting of a wider co-operation among English-speaking peoples.

In the course of his address, Colonel Helms said:

Although perfect understanding between English-speaking peoples is of vital importance, yet it is just as imperative that nations bordering on the Pacific Ocean should acquire an impartial unbiased clear conception of the difficulties confronting their neighbors. To be more specific, every endeavor should be directed towards inspiring a spirit of earnest friendship and mutual regard between Japan, Great Britain and the United States of America.

The American people do not fully appreciate the ideals, the traditions or problems of the Japanese, while the Japanese do not quite understand the peculiar conditions prevailing in the United States concerning the treatment of international questions.

For many years, the cordial relations between the United States and Japan have been unrestrained. Popular opinion in America always favored the Japanese and recognized that the wars of Japan were for purposes of defense and to preserve the integrity and security of the Japanese people. But unfortunately within recent years there has been a transformation in the American public attitude towards the Japanese, which I should like to discuss.

In 1916, the question of Japanese immigration into the United States was claimed by Californians to be of an economic nature. The latest figures of the Japanese Foreign Office indicate that there are more Japanese in the United States and Hawaii than in any other foreign country, thirty thousand more than in China including Manchuria. It is evident that this Japanese colony must have had some effect on economic conditions of our Pacific shores but whether the competition was as serious as has been claimed can not be ascertained because from an economic basis, the Japanese immigration question soon developed into a political issue in California.

The result of the presidential election of 1916 made California one of the political pivot states of the Union. The centre of political gravity in the United States has gradually shifted westward from New England to Ohio, then to Indiana and now to the middle west with California as a crucial state in all national elections. What happens in California is now of vital interest to the remainder of the country and much space in the newspapers is accorded to Californian events. The influence of this one state alone on the politics and policies of the country is very great indeed.

Immigration Question

Thus the Japanese immigration question, which was peculiar alone to California now engages the attention of the entire nation. In the course of time it would have become a dead issue if there were not a more or less fertile field for the discussion of racial questions in the arena of American politics. Our great Civil War was fought over a race problem. As a result of that war, the United States is now confronted with one of the most serious racial questions in modern history, namely the position to be occupied by twelve millions of Afro-Americans, negroes and mulattoes, in the social economic and political life of the country.

Furthermore there arose during the World War, a very delicate situation in the United States where nationalities rather than races were facing each other with all the resurrected hatreds that have permeated Europe for centuries. Germans, Austrians, Hungarians and some Irish were ready to war upon English, French, Italians, Polish and other allied people with terrible vindictiveness although they were all citizens of the United States.

Instead of being a melting pot for races, the United States became a boiling pot and many thoughtful Americans concluded that we might be called the Divided rather than the United States of America. As a result, public opinion in our country was focused upon the desirability of restricting immigration, so that there would not exist in the United States large undigested and unassimilated foreign groups, which in times of emergency would be more attached to the United States.

It was amid this tense atmosphere that our immigration laws were enacted and there might have been no discrimination against the Japanese if the American public opinion had not been led to believe by some of our newspapers that Japan was preparing to declare war upon the United States if any immigration legislation were to be passed. The Disarmament Conference dispelled all apprehension in that direction until the immigration bill itself came up in Congress for action, when through a diplomatic misunderstanding the expression "Grave consequences" was interpreted to mean war.

Since that time there does exist in certain quarters in the United States a belief that Japan is preparing to go to war with us on this question of immigration. Such sentiment is inflamed by speeches as the one delivered by Sir Charles Higham in New York predicting another world war in which the Japanese will make an aerial attack on the Panama Canal and California and land in Mexico. His remarks may not be taken seriously, but on the other hand, there are many other Englishmen such as Britten Austin, who maintain that the Russo-Japanese agreement involves a war between the Anglo-Saxon Powers and Japan, although they overlook the trade agreements between Japan and France in Indo-China. Whatever may be the justification for all this war talk, there can be no question but that the attention of the military and naval general staffs of the different nations concerned is being directed towards international developments in the Pacific.

Now a Closed Matter

Rather than have the question of Japanese immigration become a bone of international contention conducive to war, President Coolidge has publicly stated that it is a closed matter. But there is another reason why it is a closed matter. If Japan insists that this question be reopened, then Senator Johnson will have another opportunity to conduct a national campaign on racial issues against the Japanese and the Republican Party does not desire any such an insurrection within its ranks at the present time for popular opinion can be too readily inflamed by the yellow press on this matter. Senator Johnson is an able and brilliant statesman and can always make a virile campaign.

It appears to me that it would be far better for Japan to delay emphasizing this issue now and wait until the American people through a more intimate knowledge of the Japanese in the United States come to know them better as well as the Japanese travelling through our country and then through their own volition, the American people may realize that it is not only unfair and unchristianlike to discriminate against the Japanese but that such injustice is most undesirable from an economic and political standpoint. Such a course is far preferable to war, which like a great earthquake or fire would be attended with no good for any of the participants because the trade and commerce of all concerned would be destroyed while much treasure and precious human life would be sacrificed again in the world's history so that national pride and honor could be avenged.

Japanese Suspicious

The Japanese people undoubtedly have their misgivings as to the equity of the action of the American government, since they can point to a resolution adopted at a conference of jurists at Copenhagen in 1897 and more recent resolutions of the League of Nations against discriminatory legislation concerning immigration but considering the practical aspects of this immigration question, the laws of the United States would permit of no more than two hundred persons from Japan entering the United States if our recent legislation had not been passed.

It is most unfortunate that the impression is spreading that Japan is making ready for war on this immigration question, especially as it affects no more than two hundred persons. This impression exists strongly in western United States, in Hawaii, the Samoan Islands, the Philippines and Australasia. The revival of the Singapore Base, the increase of the Australian fleet and other factors emphasize the belief that trouble is brewing in the Pacific. Barriers against Japanese immigrants are being extended in the western and southern hemispheres and the psychology of the situation is far from reassuring.

War Talk False

That such impressions concerning Japan are without any foundation in fact cannot be doubted. That they are false can be readily appreciated by those of us here in Japan at the present time. On all sides there are evidences of a desire for military and naval retrenchment, especially in the vernacular press. Just recently it was reported that the dismissal of 6,000 men from the military and naval arsenals constituted a serious labor problem. Even the newspapers of yesterday carry a statement that four divisions of the army will be officially disbanded in conformity with the financial retrenchment policy of the government. It may be that the money saved by these reductions is being expended upon aircraft, cruisers and submarines as is maintained in some of the newspapers but there is certainly no appearances of war preparations to one travelling through your country still struggling with the destruction created by the earthquake and fire and confronted with a huge reconstruction program.

Instead of planning a war against Great Britain and the United States, the Japanese are looking askance at what appears to be warlike co-operation between Anglo-Saxons against Japan. It is only natural that Japan should observe with concern the revival of the Singapore Base, when there is no nation in the Pacific near to the British Dominions other than Japan, which has strong navy. It is not strange that Japan should wonder what is meant by an increase in the Australian fleet and by the maneouvres of the American fleet in southern waters. The fear that prevails in other lands that Japan is preparing to attack the United States and Australia has its counterpart here in your midst that the Anglo-Saxons are either working together or tending to work together against Japan. Without rhyme or reason there is germanating in the Pacific inflammatory elements which an accidental spark might kindle into a terrible and disastrous conflagration.

Disarmament the Hope

The time is opportune for Japan, Great Britain and the United States to unite in some program of disarmament in the Pacific, so as to dispel the suspicion that Japan will attack the Anglo-Saxons and also that England and the United States are gradually drawing together in common defense against the empire of Japan. However, at such a conference all the sacrifices should not emanate from Japan. England and the United States should take such steps upon their own initiative as would reassure the Japanese people as well as the Japanese government that your security and integrity will never be disturbed in the Pacific, so that you will be justified in reducing your first line of defense. Simultaneously England and the United

States should evolve a plan whereby Japan will find some place for the reception of her surplus population, either through economic expansion or through the acquisition of territory. We must co-operate in economic plans or go to war with each other as Europe did in 1914.

Within sixty years, Japan has become an industrial nation and she must depend on the outside world for raw materials. Either Japan must have other lands for her growing population or fewer restrictions must be imposed upon her in obtaining raw materials, so that her people may earn a comfortable and profitable livelihood at home. Economic expansion involves a freer hand for Japan in the Orient and repressing those Americans and British, who strive to foment dissension between Asiatics in the Orient.

The day has passed when as one distinguished statesman remarked at the Peace Conference in Paris, " Japan has our sympathy but the problem of over-population is her own affair." If the over-population of Japan is to remain her own affair and Anglo-Saxons continue to exclude Japanese nationals from their lands as well as restrict Japanese commercial expansion in the Far East, then I apprehend that some day in the not far distant future there will be an explosion in the Pacific that will shake the foundations of this earth with as bitter a racial struggle as the world has ever witnessed.

The white race may feel proud in the realization that it dominates nine-tenths of the people of this world although it makes up only one-third of its population but one wonders what the other two-thirds of the people of this earth will do when it dawns upon them that they control only one-tenth of the human family. As the white race occupies so small a portion of the earth proportionately to the territory it administers, the difficulties of a racial war must be apparent without any elaboration. Even a combination of Russia, Germany and Japan demands serious thought and nothing should be done by England or the United States to encourage or direct Japan to such an alliance.

Japan has a market of five hundred millions of people at her doors. Industrial efficiency and economy will provide livelihood for many more of her people but not all of them. The unoccupied portions of Japan will not absorb as many people as is popularly supposed. It is in the interest of Japan, England and the United States to work together to solve this problem, not by war preparations but through economic agreements. I would much prefer that additional territory be acquired in Asia by Japan for her surplus population than have the flower of American and Japanese manhood sacrificed in a useless war, of which the winner would lose as much as the vanquished. If there is to be a racial war, let it take place in Asia and not among the islands of the Pacific. I do not desire to see England, United States and Japan being made the cat's paw for other nations.

In closing, I would add that when President Wilson was at the Peace Conference in Paris, he realized the possibilities of co-operation between Japan and the United States and sincerely hoped that the League of Nations would offer an avenue of success for the solution of perplexing questions of international importance such as are now arising in the Pacific.

When President Coolidge completed his tenure of office as Governor of Massachusetts, there was compiled a volume of his state papers entitled " Have Faith in Massachusetts." I am certain that when his presidential term of office has been concluded that the Japanese people will study his addresses and decisions with the firm conviction that they can " Have Faith in the United States." It must be the Japanese people among this faith is inspired, for with an increase of the Japanese electorate from three millions to twelve million voters, it is absolutely necessary from the aspect of international relations with us that their political education will be of such a character that their inclinations will be just as pacific towards the United States as is the ocean separating our shores.

The Village Grouch

IN a city in Japan, lives a grouchy foreigner who publishes a village scold. Everything is all wrong with the world. His particular *bête noire* is the country in which he lives and whose hospitality he enjoys—Japan. Everything in Japan and about Japan annoys this garrulous but dissatisfied person. Yet, he stays in the country, makes his money there, employs Japanese labor and makes his profits, if he has any, out of the Japanese. He cannot see the paradox of his position. It is difficult to understand why one who hates a country as much as this editor does, stays there. There are other places but he does not go to them. His own country, for instance, would probably not tolerate so vitriolic an anti-Japanese paper. He therefore remains in hospitable Japan where they let him talk to his heart's content.

The FAR EASTERN REVIEW recently published an editorial against the recrudescence of jingoism in the United States. The FAR EASTERN REVIEW expressed the hope that anti-Japonism would cease and that the American people would be more sensible than to go to war with Japan over nothing. It quoted editorials from some of the leading American newspapers in support of its ideas on the subject. Its appeal was to sanity.

The editorial was written by an American citizen but not by Mr. George Bronson Rea, publisher of the FAR EASTERN REVIEW. Mr. Rea was at the time in Japan gathering material for a series of articles on the reconstruction of Tokyo after the earthquake. The *Kobe Chronicle*, which apparently favors a war between Japan and the United States, although its editors are neither Americans nor Japanese, turned its toy artillery on the FAR EASTERN REVIEW and its publisher, producing the following diatribe :

" Some years ago, Mr. George Bronson Rea, editor of the FAR EASTERN REVIEW, Shanghai, used to be known for his ferocious anti-Japonism, and his championship of China. He went to Paris in 1919 on behalf, as it was understood, of China, and at any rate in close association with the Chinese delegation. In Paris, however, he saw a great light, and began to belabour the Chinese with the same undiscriminating vigor that he had belabored the Japanese while he took an entirely new view of Japan's aims and actions. In his paper lately he printed a long article consisting almost entirely of extracts from various American papers deprecating the anti-Japonism which he has, since his conversion, become so much afraid might lead to war between America and Japan."

It is the misfortune of the fanatic that he seldom knows his facts. He prates in pedestrian lingo on his favorite subject with little rhyme and less reason. THE FAR EASTERN REVIEW has never been anti-Chinese. It has never attacked China or the Chinese people. It simply called attention to the fact that the position of China was being endangered by a campaign of anti-Japonism, which was engineered by a group of Anglo-Saxon adventurers, who hoped to see a war between the United States and Japan in which China would be a cat's paw and would ultimately be destroyed. It called attention to the fact that China's international position would be seriously endangered by breaches of treaty and agreement. It pointed out that playing one foreign power against another was a dangerous game in which China was bound to lose when the powers got together.

Since the Versailles Conference, much water has passed under the bridges. The policy of the FAR EASTERN REVIEW has been altogether justified by the facts of the situation. The Washington Conference brought about a change in the relations between China and Japan, such a change that Chinese officials, who in 1920, we driven out of office on the assumption that they were pro-Japanese, are now in office brought in on a wave of national reaction to all the blatant bunk advocated by the self-appointed anti-Japanese propagandists.

And the argument that a treaty is a treaty, and an agreement is an agreement, whether signed by a popular or an unpopular government, has been taken up by all the powers, particularly Great Britain and the United States, which are vehemently protesting against China's misconduct in these respects. The little villager says nothing about British and American protests against China's breaches of treaties, because he knows that the protests are justified. He only shrieks when Japan protests or when the FAR EASTERN REVIEW supports the Japanese protests. He accuses the publisher of this paper of corruption when we support the Japanese protest. But he is silent when we support the British and American protest. In a word, the little thing is so anti-Japanese that it sees red whenever anyone says there is anything good in Japan. Yet, its editor remains in Japan and makes his living among the people he hates so ferociously.

The Consortium Again

Attacks on Banking Group by Chinese Writer and a Peking Newspaper

A CHINESE in England, Mr. L. T. T'ang recently attacked the Banking Consortium in rather unmeasured terms. The gist of his argument can be put down in four questions :

(1) Does China require foreign loans ?
(2) Did the foreign loans benefit China as a whole ?
(3) Are the foreign loans unfair ?
(4) Is unfair diplomatic pressure used in connection with these loans ?

Mr. T'ang's attacks have been seconded by similar ones made in a Peking newspaper, whose editor has consistently opposed the Consortium, favored a free hand for all in the financing of China, and who has severely taken to task the diplomats and foreign powers which have supported the Consortium program.

In two editorials on the subject, the *Far Eastern Times* takes the Consortium to task. In one published on April 14, it argues that the Consortium ought not to be supported because the Chinese will have nothing to do with it. The Chinese do not want the Consortium, will not do business with it and therefore the foreigners ought to discountenance it. In a previous editorial on Dr. Schurman's retirement from China, the same newspaper published the following :—

> American policy in China so universally receives the approbation of the Chinese themselves that it is difficult to understand how it is that the American authorities should so long have been blind to the fact that there is one aspect of that policy that most violently antagonizes the best Chinese sentiment, and that aspect is the whole principle of the New Consortium. The New Consortium was conceived by American financiers at a time when it was believed that, by reason of the impoverishment of the War, European financial interests would be incapable of carrying into effect the undertakings for which they had obtained concessions, and that therefore a good opening offered itself for a fuller participation of American capital in the development of this country. European finance had perforce to accept, practically without suggestion of modification, the terms on which American finance came to its help, and the result was the New Consortium Agreement, made by the bankers and endorsed by their respective governments. The high hopes then formed have proved entirely illusory. The New Consortium has done not a single cent's worth of business in this country. It has not even been within sight of doing any business. The truth is that the whole conception of a monopoly, which the New Consortium essentially is, creates both antagonism and distrust in the Chinese mind. The first foreign wars of China were fought to maintain a similar monopoly, that of the Co-Hong at Canton, and of Canton itself ; and on the foreign side the issue was joined in order to break down that monopoly. Now, three-quarters of a century later, we find the tables turned, China solidly opposed to the monopoly principle and the foreign Powers committed to it. The Old Consortium was not loved, for it claimed a monopoly of general loans and frequently exacted as a part of such accommodation terms which limited the freedom of action of the Chinese Government. The New Consortium is still less loved, because it carries the same principle from the sphere of administrative loans to that of industrial, constructive and economic activity. It is true that by verbal subtleties the members of the New Consortium may convince themselves that this is an entirely wrong idea of its purpose and functions, but self-conviction does not convince others, and the Chinese view, in spite of abundant propaganda, remains unchanged.
>
> The New Consortium Agreement has still and only eight months to run. Dr. Schurman must be aware what Chinese feeling is on this matter. He must know what is holding up all railway construction in this country ; and he must realize that even were the country tranquillized to-morrow the New Consortium would not have a host of a chance of doing business. He could render immense service to this country by speaking very frankly to President Coolidge on this matter. The jettisoning of the Lamont Doctrine, which is the basis of the New Consortium Agreement, would immediately liquidate resources and energies now hopelessly immobilized. The first fruit of liquidation would be the formulation of terms on which the Hankow-Canton and the Hankow-Szechuan lines would be carried to completion, and thereafter might well follow a general resumption of constructional undertakings, as well as the highly necessary re-conditioning of the existing railways, all of which demands a very considerable expenditure of capital, which demands a very considerable expenditure of capital, which the Chinese treasuries cannot supply. These things, and their consequences, need to be brought home to the American Government and if the departing American Minister could drive them home to his superiors in Washington he would render both his own people and the people of this country an inestimable service.

It is necessary perhaps to point to the principal Chinese objection to the Consortium in answer to this argument. The Chinese oppose the Consortium because *they object to any form of foreign supervision of the expenditure of the loans*. The official of the various Chinese governments which have been in power during the past decade have utilized foreign as well as domestic loans and governmental receipts for purely political purposes, although they can point to such a constructive efforts as the Peking-Suiyuan line, which is rather the exception that proves the rule. On the whole, the Chinese people have had no return from their government either for the amounts they have paid in taxes or for the national indebtedness which has been growing by leaps and bounds.

The Consortium raised the point in its negotiations with the Chinese Government that under present conditions, the banks would not feel justified in encouraging the purchase of Chinese bonds and that, in view of the lack of governmental authority, the constant civil wars, the dissipation of resources, the unpaid foreign obligations, it would be difficult under any circumstances to dispose of such obligations on foreign markets. The peculiar conduct of the Chinese Government with regard to the Hukuang Bonds has done much to damage China's credit on all markets.

As much as we sympathize with China in her transitional period, we cannot but appreciate the importance of the banker's point of view. The bankers want to do business with China and would grant China easier terms if they thought it a safe investment to do so. Their classification of China as a bad risk, is not done for political purposes but is based on business considerations. Were China a good risk, the bankers would flock to the country with the world's surplus money. The bankers must have realized earlier than those who live in China did, just how bad financial conditions in China were. To take the railroads of the country as an example! During the last war, the damage done to the railroads was so great, that it is estimated that China cannot of her own resources remedy the loss in ten years. Who is to pay the loss ? What are the foreign bond-holders going to receive during those ten years ? Who is to recompense them for their losses ? Of course, when a man buys a bond he takes a certain risk, but once bitten twice shy.

A full reply to the arguments against the Consortium was published in the *Financial News* of which we quote as follows :

China and Foreign Capital

According to the author there is sufficient capital in China to enable the country to develop gradually without the aid of foreign capital. He does not attempt to make any forecast as to the period which would be required for such a gradual evolution. Yet, in the view of those possessing a thorough knowledge of conditions in China, it may take centuries to reach an advanced stage of economic development if she is left to her own resources. The question is whether it is to the interest of the Chinese nation to remain for another few centuries at the backward economic stage where she has been for several thousand years, or whether is would be desirable to follow Japan's example in becoming modernised in a few decades.

In our view, it is of extreme importance for the great majority of the Chinese people to adopt modern economic methods as soon as possible. Being an overpopulated country, the bulk of its population is condemned to terrible sufferings, as compared to which the inconveniences caused by foreign interference are negligible. *The only way to salvation is the utilization of the country's enormous natural wealth, which, properly administered, would secure a decent existence to millions of human beings who are permanently on the verge of starvation.* The wealthy classes of the big cities can well afford to wait rather than admit foreign capital on "humiliating" terms. Yet, if a plebiscite could be arranged, and if the population could be made to understand what both alternatives mean to them, there is hardly any doubt that over 99 per cent. would vote for the admission of foreign capital.

How the Funds were Used

Mr. T'ang would have a strong case as far as the second question is concerned if he had not weakened it by overstating it. As a matter of fact, a substantial portion of the loans obtained by the successive Chinese Governments was wasted. But Mr. T'ang, when attempting to put the blame for this on the foreign banks, is rather inconsistent, for, in the very same article, he attacks the lenders for enforcing the strictest possible control in order that the loan should be spent for the purpose it was raised. If every loan had been accompanied by the same extent of control as the railway loans, so as to compel the Chinese Government to spend their total yield on the improvement of the nation's welfare and intellectual level, there would be no ground for attacks regarding the unproductive use of the loans, but, at the same time, the interference of foreign interests in China's financial administration would have been regarded as even more "humiliating." On the other hand, if the industrial loans had been abandoned to the mercy of the Chinese Administration, the accusation of excessive interference would not have arisen, but, at the same time, the outcry against the unproductive use of the funds would have been stronger, for there is no doubt that but for the strict control these amounts would have also been squandered. As it is, a substantial part of the foreign capital has been invested in useful enterprises and contributed to increase China's national wealth.

Are the Terms Unfair?

It is alleged in the article in question that the terms of the loans are unfair. Among others, it is objected that they carry with them a specific guarantee and the right of control over certain revenue services. Even if such clauses appeared humiliating before the war, since then European nations at a very advanced stage of development have had to accept them. Moreover, the present political chaos has supplied ample justification for those terms, as it is now evident that, but for the control over pledged revenue, thousands of bond-holders would suffer in consequence of the seizure of receipts by local military despots.

Mr. T'ang criticises the clauses which debar the Chinese Government from the right to increase the amortisation of the loan or to convent or redeem the loan during a given period. However, the same rules are applied to practically every Government issue, none of which can be repaid at the discretion of the borrower. Apart from this, if the Chinese Government wished to repay its loans before they fall due, and possessed the funds for that purpose, it is at liberty to repurchase them in the open market, which would be all the more profitable from a Chinese standpoint, as all Chinese Government loans are below par. Yet, considering that at present the Chinese Government is hardly able to raise funds for current expenditure, the repayment of loans is out of the question.

"Diplomatic Blackmail"

It would be useless to deny that finance and diplomacy have proceeded hand in hand in China. However, there is nothing infamous in that, and if a foreign Government applies diplomatic pressure in the financial interest of its citizens it certainly does not justify the strong term of "diplomatic blackmail" used by Mr. T'ang. In fact, that is one of the principal tasks of the Governments in international relations, and it is by no means confined to backward countries. As to the rôle of the Consortium, it was established mainly to protect China from the improper influence of any of the great powers.

The foreign influence in Chinese economic life is bound to be temporary, for the utilization of the country's natural resources tends to accelerate the accumulation of native capital, which will gradually substitute foreign capital. This was the case, among others, in the United States. Should that country, in its early stage of development, have followed the same anti-foreign policy suggested for China it would be still a primitive agricultural State, with insufficient means of communication and without sufficient capital, instead of being the world's creditor. If the Chinese intellectuals would concentrate their energies to bringing about the elimination of civil war and corruption from China, instead of leading a crusade against foreign capital, which they require, they would certainly render a more useful service to their country.

Labor in China

THE growth of labor unions in China and the increasing number of strikes is causing anxiety among the investors in the many industries in the large cities of China. The labor movement is a result of the influx of foreign ideas along with the industrialization of industry, but it is impossible to attribute the development of this tendency to any one foreign country. The Chinese worker as he becomes urbanized comes in contact with European and American ideas and seeks a standard of living and a return on his labor closer to what the European and American worker is getting for the same labor.

Two errors are apparent in the situation : the first is that the Chinese laborer is on the whole not as efficient as the European and American laborer and therefore his capacity for production is less. If he is to be paid an increased wage without an increased production, the industry will be seriously damaged. When leads to the second important error in the situation, namely that most of China's industries are still infantile. Few of them are profitable. Practically all of the cotton mills, for instance, which were organized by Chinese have gone into bankruptcy because of under capitalization and the incapacity of the promoters and directors to manage huge industries in the interests of the shareholders. Most of these mills have passed to foreigners or are shut down. To increase the wages of the workers, to shorter their hours, to effect similar betterments will result in the complete annihilation of the industries and will discourage foreign capital from coming into the country for industrial purposes. In such a reactionary tendency the laborer in China will suffer as much as the capitalist, as he will find himself without work. It is not usual for labor anywhere to think in national terms or even to be far-sighted. The worker usually fights for his own full stomach. Nevertheless, the situation does hold elements which it would benefit him to consider seriously from his own standpoint. If he kills the industry which is feeding him he will have to go back to the overpopulated villages in the interior from whence he came. And there is this very definite possibility, for the Chinese themselves are unused to investing their surplus capital in industrial enterprises and a continuation of failures of the companies which have been started with so much hardship, will frighten investors away from them, just as they have been frightened away from stock exchanges during the past few years.

The association of the labor union with politics naturally gives them a bad reputation in a country where politics is anything but savoury. In Canton, the labor unions have been the mainstay of the Bolshevik government established there and have been utilizing their political power to harass and annoy the merchant class until the better elements have left the city and have taken their goods elsewhere. In Hankow and Wuchang, the labor unions have instigated an anti-foreign movement and have endangered their own standing by the constant annoyance to business because of their political activities. In Shantung, particularly in Tsingtao and Tsinanfu, the labor unions have associated themselves with a local political movement which has for its object the embarrassment of the present Peking government and have created such disturbances that capital is regarding this province as an unsafe risk. So it goes everywhere.

In China, as the world over, when the laborer is asking for better conditions for himself even the most hardened capitalist often sympathizes with him and the public generally will seek to assist him. But the moment organized labor utilizes its power to disturb social and economic conditions in the interest of any political group, a reaction sets in unfavorable to labor and from which he usually suffers. That is exactly what is happening in China to-day. Whereas when the laborers started their campaign for the improvement of their condition, much sympathy was extended on them, to-day the general public is worried over the possibilities of such a movement synchronizing with political tendencies of a doubtful or even harmful character. The laborer is losing the goodwill of the public and as he is in a minority in the country, which is largely agricultural, he will suffer from this revulsion of public feeling.

Another labor movement has appeared in Shanghai and is supported principally by the proprietors of the industries and public spirited men and women. This is the movement for the partial abolition of child labor in the International Settlement. A year ago, the Shanghai Municipal Council appointed a commission to investigate the conditions of Child Labor in Shanghai. This commission prepared a report which was published. At the last Ratepayers' Meeting, the recommendations of the commission, which were very liberal, were defeated by the absence of a quorum. A movement is now on foot to call another special ratepayers's meeting for the purpose of enacting these regulations. The British Consul-General has sponsored such a public expression of opposition to child labor and it is more than likely that the new regulations will be passed. In that case, no child under ten will be permitted to work in mills, factories, etc., in the International Settlement, but it does not mean that children will not be permitted to work in mills and factories in other parts of Shanghai under Chinese or French jurisdiction. That will, of course, be the next endeavor of those who are sponsoring this plan. The Chinese themselves are not interested in the abolition of child labor and are not supporting this movement. It has been pointed out that if the new regulations are passed the International Settlement will have to obligate itself to care for the children and perhaps to educate them. It is understood that the authorities are prepared to undertake such measures.

China's Tribute to Cement

IN the course of an address in celebration of the invention of cement, Mr. Lu Mo-tsai, a Director of the Chee Hsin Cement Company said :

One hundred years ago, an insignificant brick mason in Leeds who was experimenting with limestone taken off the roads in order to produce something which can stand the weathering action of water and scorching test of fire. After overcoming baffling difficulties, trials and disappointments he finally succeeded in his effect.

To-day engineers and architects all over the world have bowed down their heads before Aspdin, to pay him their warmest tribute for this epoch-making discovery which has not only resolutionized the living conditions of the people in the West but also influenced the thoughts and habits of the inhabitants in the Orient to a considerable degree. It is only fitting and proper that both Chinese and foreign engineers, architects, and contractors, cement producers should assemble somewhere to celebrate the century of the invention of cement.

As the pioneer and the largest cement producer in China, it is a very pleasant task dwelt on us to invite all the leading engineers, architects, contractors all over the nation and the delegates from the Engineering bodies such as the Chinese Engineering Society, The Chinese Society of Chemical Industry, etc., represented in this important gathering, to register our most hearty appreciation of Aspdin's efforts, to review the most modern engineering achievements which are only made possible through the application of cement and the status of cement industry in the world and especially that in China. Judging from the attendance to-night we are very grateful for your hearty response to come to this convention. On behalf of the Board of Directors and all the staff members of the Chee Hsin Cement Co., we bid you our most cordial welcome. We welcome you, because a number of you are early pioneers in advocating the use of cement in construction materials and in popularizing its application to all sorts of industries. We welcome you, because you are the missionary crusaders to preach the usefulness of the reinforced concrete construction for factories, godowns, mills, etc. We welcome you, because you always advocate the use of the highest grade cement in order to make your work lasting and enduring. We wish to take the opportunity to thank you for your uninterrupted and constant patronage of our Company's products which are best obtainable in China. We solicit your generous and continuous co-operation in the years to come.

The romance of the development of cement industry in the world is interesting indeed, yet the romance of the growth of our Company is more romantic. This modern constructional material—cement, made its first appearance in 1886 at Tangshan Cement Factory which met its failure immediately. Then our Managing Director, Mr. Chow Chih-Chi stepped in and reorganized the whole company. In his new undertaking he met difficulties and disappointments, but he has conquerred them all. The public was indifferent to the use of cement, yet he faced this cold indifference with optimism and harder efforts on his own part. The first output in 1886 was only 26,000 barrels a year. Now it gradually increase to 2,200,000 barrels almost 100 times fold. Forty years ago we used the old crude, costly and time-wasting brick kilns. At present we have installed the most modern rotary kilns. This progress and this growth we attribute to your co-operative effort and your unfailing patronage.

However, if we attempt to compare the production of cement in the world with that of China, we are lagging behind. In the United States there are 115 cement plants, producing 145,000,000 barrels, the consumption of cement per capita is 450 lbs. Even in Japan they have 24 plants, producing 9,000,000 barrels. The consumption per capita is 83 lbs. While in China where we have the largest and most numerous population, the number of cement plants is only 5, producing 3,000,000 barrels a year. The consumption of cement per capita is only 3 lbs. This will clearly show the undeveloped and deplorable state of cement industry in China which should invite your most serious consideration. May we hope that through this convention the Chinese business men will be more interested in the development of cement industry. All the efforts should be crystallized in the more universal use and application of cement throughout China. May we also hope that through this convention government counsel and public opinion shall be crystallized on and directed at the dire need of better highways and other means of communications and transportation which and which alone shall open up China's vast hidden treasure and resources for the benefit of our people as well as that of humanity.

Edgar Allen Steel Foundry Book

An interesting and profusedly illustrated Steel Foundry Book has been issued by Edgar Allen & Co., Ltd., of Sheffield. The book not only is a catalogue of steel castings but gives full data with regard to the service provided by the manufacturers. The methods of production and testing are discussed at some length. The foundry book might well be on the desk of everyone interesting in steel castings.

The Pao Hsing Yung Coal Mining Co., Ltd., owning coal mining rights at Kinghsien, Anhwei province, is to increase its capital to $1,000,000. Its capital at present is $500,000. The increase will make possible installation of modern mining machinery. The Shanghai office is at 68 Rue de Ningpo, French Concession.

History of Mining in the Philippine Islands

By Warren D. Smith

In the course of a very valuable volume of the "Geology and Mineral Resources of the Philipping Islands" by Warren D. Smith, published by the Bureau of Printing, Manila, the following interesting article appears.

THE history of mining in the Philippines, until within the last few years, has been in the main a long record of failures, and at the present time there are only perhaps a half mines that are earning sufficient profits to make the ventures worthwhile. One of these is the Philippine Dredges Company, an Australian and New Zealand company, with a fleet of four dredges on Paracale River, only one of which is active. Other successful mines and mining companies are the Syndicate and the Colorado, two quartz properties on Masbate ; the Benguet Consolidated Mining Company, Near Baguio ; the Philippine Coal Mining Company, on Batan Island ; and the group of crude iron furnaces owned and operated by Filipinos in Bulacan Province, Luzon. The Benguet Consolidated is the most successful of these. Mining in the Philippines has been more successful since 1898 than in all the centuries preceding.

The First and Second Chiefs of the Philippine Mining Bureau: Mr. H. D. McCaskey Seated on the Left; Lieut. Charles H. Burritt Seated on the Right

Gold

Probably the earliest operations in these Islands, as elsewhere, were on placers ; the work consisted of more or less haphazard and desultory washing of the sands and gravels in the various streams. There are numerous traditions relating to the early visits of the Chinese to the Islands, who came to seek gold treasure, and the raids of the Moros into the northern provinces where gold was known to exist.

In the Chronicles of the Franciscan Order in the Philippines Father San Antonio refers to the word *mait* as the Chinese name for Mindoro. It seems that *mait* in Chinese stands for "gold." It may also refer to Masbate where there are remains of old Chinese workings near Aroroy. Whether these represent the activities of Chinese before the Spanish Conquest or are of a later period cannot be definitely ascertained ; but it is claimed, in support of the theory of ancient workings, that pieces of Chinese pottery older than the Ming Dynasty have been found near the old tunnels and open cuts. There is very little definite information in regard to these remote times and operations, and the details are not essential now. Suffice it to say that gold has been and can be panned from streams from one end of the Archipelago to the other.

I am indebted to Prof. H. Otley Beyer for the following memorandum :

"Some years ago there was found in a tributary of the Agusan River near Esperanza, Mindanao, a massive golden image which for historians, archeologists, and miners is of great interest. The image was of twenty-one carat gold and weighed about 1,790 grams, the color of the gold being very pure yellow. The figure of the statuette 8 to 9 inches was of a Buddhist deity and the style of art was very like that of the Ngandjuk Period in Javanese art."

The image, according to Professor Beyer, clearly was not made in Java since the workmanship is cruder than that of the Javanese and the gold is of a distinctly different color and quality from that employed in such work in Java. Professor Beyer's opinion is that Javanese miners worked the Mindanao gold deposits as early as 1350.

The most talked-of district for the last three centuries, perhaps, is the Paracale-Mambulao district in Camarines Norte. The history of placer mining in the Philippine Islands is in large part the history of this district. The first operations here were those carried on by Filipinos with the *batea*, a wooden pan. Then there came into use a small dipper dredge, with a treadmill device for raising the dipper (Plate 24), capable of handling only 2 or 3 cubic meters per day. The third stage in the development of the industry came with the installation of three medium-sized but modern dredges on separate properties. Two of these were New Zealand types and one a California model. The fourth stage, which has already been entered, is the consolidation of properties and the utilization of large capacity dredges, capable of handling from 2,000 to 3,000 cubic yards per day.

In the early days, long before American occupation, Mambulao, which is now a mere collection of shacks, was a city of much importance due to the flourishing gold mining and the fact that the Spanish galleons from Mexico sometimes stopped there. I recently saw some Spanish silver coins dredged up near this town, bearing the date of 1739.

Concurrently with the crude attempts at dredging in the days before American occupation over a score of arrastress of the Mexican type were in use in the hills surrounding Paracale and Mambulao. Today only one of these can be seen, and it is no longer in use.

The year 1894 is an important one in the history of this district. It is known as the *prohibition*, when the Spanish government prohibited the Filipinos from engaging in the mining industry.

At the present time this district, which was again flourishing during the decade from 1905 to 1915, is almost dead. The banner year in this district was 1915 when there were nine dredges, all told, operating in Paracale, Gumaus, and Malaguit Rivers.

In quartz mining the first step was marked by the use of the mortar and pestle, a universal device among primitive people. This was succeeded by the arrastre, which apparatus was introduced by the Spaniards from Mexico into the Mambulao district. Then came the stamp mill, erected by the Philippines Mineral Syndicate, which company came to grief, however, as a result of the insuraction of 1896, before producing anything. With American occupation came the floating of two quartz mining companies, the Tumbaga and the San Mauricio, which used still more up-to-date machinery. In 1910, however, both of these shut down, and there are practically no operations on quartz lodes worthy of mention in this district at the present time.

The history of operations in Masbate and Benguet has been similar in many respects, but with the difference that those two districts are better adapted to quartz mining. All attempts at dredging in Masbate have so far proved futile, while the Benguet country never was adapted to this class of mining.

The chief events in the history of Benguet are the erection of Hartwell's 3-stamp mill in 1903; the beginning of operations by the Benguet Consolidated Mining Company in 1907; the typhoon of October, 1909, which severely crippled the plants of the largest two mines; and the beginning of operations on the headquarters property in June, 1911. In 1914 the Benguet Consolidated plant was rehabilitated, and to-day it is the greatest gold producer in the Philippines.

In Masbate there have been many ups and downs also, but at present there are two successful mines in operation on lodes, the Colorado and the Syndicate.

Coal

Coal in the Philippine Islands was discovered by Europeans, in 1827, on Cebu, and on Batan Island in Albay Province in 1842. The first coal entries were made on Batan Island in 1847, and the first concession on Cebu was given in 1853. Very little mining was done until after 1890. The two most important properties were the Bilbao and Chifladura mines on Batan, operated by the Minas de Batan Company, and the Compostela and the Camansi mines consolidated by Enrique Spitt, on Cebu. These failed and have done nothing since the insurrection. A very comprehensive plan for mining operations on the part of the government with Enrique Abella, chief of the mining bureau, in charge, was about to be consummated when the insurrection broke out in 1896. In 1904, the United States Army began exploring Batan Island, but never accomplished much, and in 1910, operations ceased by order of the Secretary of War. In 1907, the East Batan Coal Company began operations and did fairly well until 1911, when it went into the hands of a receiver and was bid in by the government to satisfy its preferred indebtedness. With the coming of the World War and the need for coal at any price the Philippine Coal Mining Company began operations near the old site of the East Batan Company mine, and in 1921, this was the largest coal mine in the Islands. In 1918, the National Coal Company was formed. Its career has been a checkered one, but now, at the end of 1922, it has reached the production stage.

Iron

The earliest record contained in the archives of the Bureau of Science with reference to iron mining bears the date, December 12, 1781, and this is an order of instructions to the Governor of Angat, Bulacan, Luzon, through the Governor of Bulacan, from the Superior Government of Manila to render every possible assistance to Chaplain Juan Belli of the Armada in the working of his mine. However, very little was accomplished in this undertaking owing to "the indolence and repugnance with which the natives assisted in the labor of the works."

The next that we learn in chronological order is that Santiago Hison, past captain of the Guild of Mestizos of Angat, makes a petition to the Governor of Angat asking that he be declared the discoverer of the mine Sapang Bacal. The entire history dimensions, and production of this mine are not known. After passing from one owner to another, and ownership being contested several times, the mine at last came into the possession of Mrs. Maria Altesa Fernando, one of the most interesting personalities in the mining industry in the Archipelago. Several other *mines* in Bulacan have crude furnaces erected near them, but Mrs. Fernando has perhaps made the greatest success of the business. There are now on her property several crude furnaces which turn out approximately 150 tons of iron a year; the iron is made into plowwhares and sold in Bulacan and neighboring provinces.

In 1917, a Japanese company leased the property on Calambayanga Island in Mambulao Bay, Camarines Norte, and until the close of the World War mined and exported ore from that place.

Early in 1920, a furnace was erected at Limay, on Manila Bay, to treat briquetted magnetic sands, but this has not attained success.

Perhaps the most important event in the iron industry in the Philippine Islands was the discovery, about 1912, of a large deposit of lateritic iron ore by Mr. H. F. Cameron, a government civil engineer, in Surigao, Mindanao. The government has since reserved this deposit. The National Iron Company was soon after organized to exploit it, but nothing has been done by this company in the field.

Copper

The Spanish mining engineer Santos, (538) in his report of 1862, says: Even in some of the most ancient history of these Islands copper is cited among other metals as one of the products which nature affords with considerable abundance, the natives of the mountains utilizing it for arms, ornaments, and in a profitable business, but the most noteworthy document which claims attention by its official character and in the exactness as later verified, is the communication to the Governor, His Excellency the Captain Sr. Don Pascual Enrile of 1833, in which he states that the utensils that the Igorots of the rugged mountain ranges which separate the province of Cagayan from that of Ilocos, made of the copper from the mines, have been known for several centuries. With this communication were sent numerous spikes of the metal mentioned, which, assayed in the Direccion General de Minas, gave such good values that not only was it recommended that mines be opened for the exploitation of so much mineral, but it gave rise to the creation of the inspection of 1838 and the mining law of 1846.

In 1850, a military expedition was sent to this region (near Mankayan in Lepanto, Mountain Province, Luzon) to make an investigation. Antonio Hernandez, a government engineer, went with the expedition and made maps, collected specimens, etc. He found that the Igorots had made a number of small pits and shelves, dug out the high-grade ore, and afterward smelted it in a crude way which has been fully outlined in Santos's report. A translation of this report is included in a paper by Eveland (236). The report of Hernandez awakened considerable interest, and the governor took steps to carry on mining and smelting on an improved basis. However, it was not until 1856 that an exploration for demarcation of the property was made. Finally an agreement was made with the Igorots of that section by which 500 pesos were paid to the government for the concession. The Igorots were guaranteed employment in the mines, a stock company was formed under the leadership of Mr. Babbas, which laid out two pertenencias of 83,000 square meters each, and preliminary work was begun. The company operating here was called the Cantabro-Filipino Company.

The year, 1860, marks the first actual production, and in 1861, about 25 pounds of copper were produced; in 1862, 1,800 tons of ore; and in 1866, about 234,807 pounds. Up to 1874, the total output was about 2,500,000 pounds of copper. In 1875, this company suspended work. The cessation of work was probably due to the death of Santos, which occurred in that year. From that time the mines have remained idle, except for the crude operations of Igorots and Chinese, and the prospecting and development work done by Americans.

All attempts to float the property have been unsuccessful. This is the only part of the Philippines where a commercial deposit of copper has been discovered.

Petroleum

The first mention in geologic literature of gas or petroleum in the Philippines, so far as is known, is found in the description of Panay, by Abella, 1890.

In 1896, an oil well was being bored on the estate of Smith Bell & Co., near Toledo, on the west Coast of Cebu. In that year an insurrection broke out against Spanish rule and the dillers (Americans) were driven from the well, which has remained idle ever since. It is now choked with rubbish.

About 1910, a number of Americans became interested in petroleum seeps, long known to the Filipinos to occur on Bondoc Peninsula in Tayabas Province, Luzon, but apparently unknown to the Spaniards. Two shallow wells were dug near those seeps and some oil was pumped, but nothing of any great importance has been done since then except to keep up assessment work on the properties. However, several foreign petroleum companies have from time to time made surveys of this and other fields.

About the end of 1917, there was considerable excitement over the discovery of oil in the Cotabato region of Mindanao. In 1919, Act 2841 was passed, providing for the creation of the National Petroleum Company, but this company has done no active field work.

In August, 1920, the Philippine Legislature passed an act "to provide for the exploration, location, and lease of lands, containing petroleum and other mineral oils and gas in the Philippine Islands," and rules governing the same were made by the Secretary of Agriculture and Natural Resources. In November, 1920, ground on Bondoc Peninsula, Tayabas Province, Luzon, was leased to the Richmond Petroleum Company, a subsidiary of the Standard Oil Company of California and in March, 1921, drilling was begun.

History of Mining Legislation in the Philippine Islands

Paralleling the history of active mining operations in the Archipelago is the history of mining legislation, which may be divided into four distinct periods.

The period of Spanish legislation.—The period from 1846 to 1896 was not marked by any conspicuous successes and it is more than likely that the type of legislation was largely to blame for this condition. The Spaniard, like other peoples of Latin origin, strongly favors regulations; his mining operations have been so fettered by the red tape of regulations that he often overlooked the main business in hand. The Royal Decree of 1846 is theoretically a masterpiece, but practically of little use, judging by results. However, this was the great period of discovery, if not of recovery. During the insurrection (1896 to 1900) there was an unproductive interval of several years. Everything was in a state of transition and uncertainty. It was a bad time for such a sensitive business as mining.

The period of American legislation.—With the coming of stable conditions, new blood, and the passage of the Act of Congress of July, 1902, began the Anglo-Saxon period, in both mining and legislation. With few changes, the basic principles of the American mining law were adopted, thus vastly stimulating the industry, and American prospectors, mostly discharged soldiers, swept over the Archipelago, visiting every island. Notwithstanding this invasion, very few deposits of mineral not known before were brought to light during this period, though several mining ventures were started. It was a period of active and successful mining.

The period of Filipino-American legislation.—In this period, beginning in 1913 and continuing to 1921, the principal thing to be noted is the transition from the old freehold basis to the leasehold for coal and petroleum. The acts bringing about this condition were passed by the Philippine Legislature. There is a partial return to the principles underlying the earlier Spanish codes, the dominant feature of those being the assertion of the Regalian doctrine; that is, that the state and not the individual is the owner of the minerals. This is the period of nationalization and experimentation.

The period of Filipino legislation.—The fourth period has not yet begun, but will be entered upon with the passage of a complete new mining act and the organization of a mining bureau to administer its provisions.

This brief history of mining in the Philippines would be incomplete and inconsiderate were it to contain no reference to the practical mining men who have worked hard and long to wrest the treasures from Nature. I have already mentioned the most conspicuous names of the practical miners and engineers of Spanish times, and shall now devote attention to that band of hardy Americans, New Zealanders, and Australians who have been working well during the two decades and more of American occupation.

It will be impossible to mention all of these men, but without meaning to indulge in invidious comparisons (for all have contributed some noteworthy share to the work) a few of the most conspicuous must be named.

Among the earliest prospectors in the gold fields were Messrs. A. Heise, Herbet, Edelmeir, and Berkenkotter in Masbate. Either Mr. Heise or Mr. Herbet was the first to locate claims now owned by the Colorado Mining Company, and Mr. Berkenkotter, those upon which the Syndicate mill is operating. Mr. Edelmeir has the distinction of being the first American to prospect for lodes on Masbate Island, and I am indebted to him for much information concerning the early history of mining in that region. Indelibly connected with the later history of Masbate, and with the mining industry in general, is the name of Colonel H. B. McCoy, one of the most constructive active of the Americans who remained in the Philippines after the Volunteer Army of 1898 was disbanded.

In Benguet, we note first the name of Jack Hartwell, who built the first stamp mill in that region. Hartwell died of cholera in Baguio in the early days, and his little 3-stamp mill has long since been dismantled.

In 1902, Mr. H. Clay Clyde, an American prospector, discovered the Benguet Consolidated lode in Antamok Creek, which is the bonanza, of the Far East. Mr. Nels Peterson and Mr. M. A. Clarke, with Mr. Clyde, organized this company. Mr. C. M. Eye, mining engineer, and Mr. A. W. Beam, to-day the president of the company, have done perhaps more than any others to develop the property to its present secure place. Mr. O. L. Kettenbach is the present able superintendent.

Another noteworthy prospector, of the district is John ("Tex") Reavis, who is to-day one of the best-known men in the mining fraternity in the Philippines.

One name, that of H. Phelps Whitmarsh, a leading business man of Baguio to-day and long a mining promoter, will always be mentioned in connection with this district. Mr. Whitmarsh, who got his first mining experience as a mere boy in Australia, has done perhaps more than anyone else to fight the uphill battles of mining in this region and is now engaged in promoting still larger schemes for developing this field.

In the Paracale field there is a host of names, all deserving of mention. Of these, the most conspicuous is that of Judge Frank B. Ingersoll who has done more than anyone else to promote the interests of this district, and who has been active in connection with the industry in general for nearly twenty years.

In the practical operations Messrs. Kane and Telford, New Zealand dredge masters, are perhaps the best known.

In lode mining in this district, Mr. A. C. Cavender and Mr. John Moissan have perhaps been the most active. Mr. John Mueller's name is the one most associated with mining exploration on Marinduque, but that of Mr. E. E. Calvin is almost as well known.

In the Tayabas oil field Mr. E. W. McDaniels has been the longest identified with the slow developments of that region. In connection with the "asphalt" deposits of Leyte Wm. H. Anderson deserves special mention.

In the coal fields many persons have been active, but ex-Governor A. U. Betts, of Albay Province, has the distinction of having been longer connected with the industry than any other, and he has been the most successful. He is the original promoter of the East Batan coal mine and is interested in the present Philippine Coal Mining Company, near the site of the old mine.

One of the most picturesque, if not successful, figures among the old-timers in the Philippines was "Al" Wright, a former color sergeant with the Rough Riders under Roosevelt in Cuba. Wright's Philippine activities were confined largely to the Mankayan-Suyoc district in the highlands of Luzon.

In mentioning exploration work in Mindoro, Panaon, and other less well known localities the name of Mr. Villager is always heard. He is one of the oldest and hardiest of this band of prospectors.

In the early days of American occupation there was a small army of prospectors let loose upon the country, many of whom did yeomen's work in opening up the wilderness. Most of these have gone; some have died, others simply left disheartened, as they were given little or no encouragement, and the country has lost a valuable asset, since there are none to take their places.

Prospecting is peculiarly an American profession, and as yet the Filipino shows little capacity or desire for this sort of hard, active, free life. It has been suggested by a Filipino mining engineer

(*Continued on page 242.*)

Residences Erected by the Shotoku Society at Dairen

The Oriental Development Company in Korea

THE object of the Oriental Development Co., Ltd., which was established in December, 1908, is to finance various enterprises for the development of Korea and to manage colonization projects in Asiatic countries. The company is capitalized at Y. 50,000,000 of which Y. 35,000,000 was paid up, and has been granted the privilege of the issuing debentures up to ten times its paid-up capital, the debentures issued up to date amounting to over Y. 140,000,000.

The following summarizes the various enterprises in Korea in which the company is interested, although, the undertakings now embrace Manchuria, Mongolia, Siberia, Central China and the South Sea Islands.

The following shows the area of the land in Korea owned by the company.

Paddy-field	44,332 *cho*	6 *tan*	6 *se*
Field	20,429 ,,	3 ,,	9 ,,
Forest	9,475 ,,		
The Others	9,933 ,,	3 ,,	2 ,,
Total	84,170 ,,	3 ,,	7 ,,

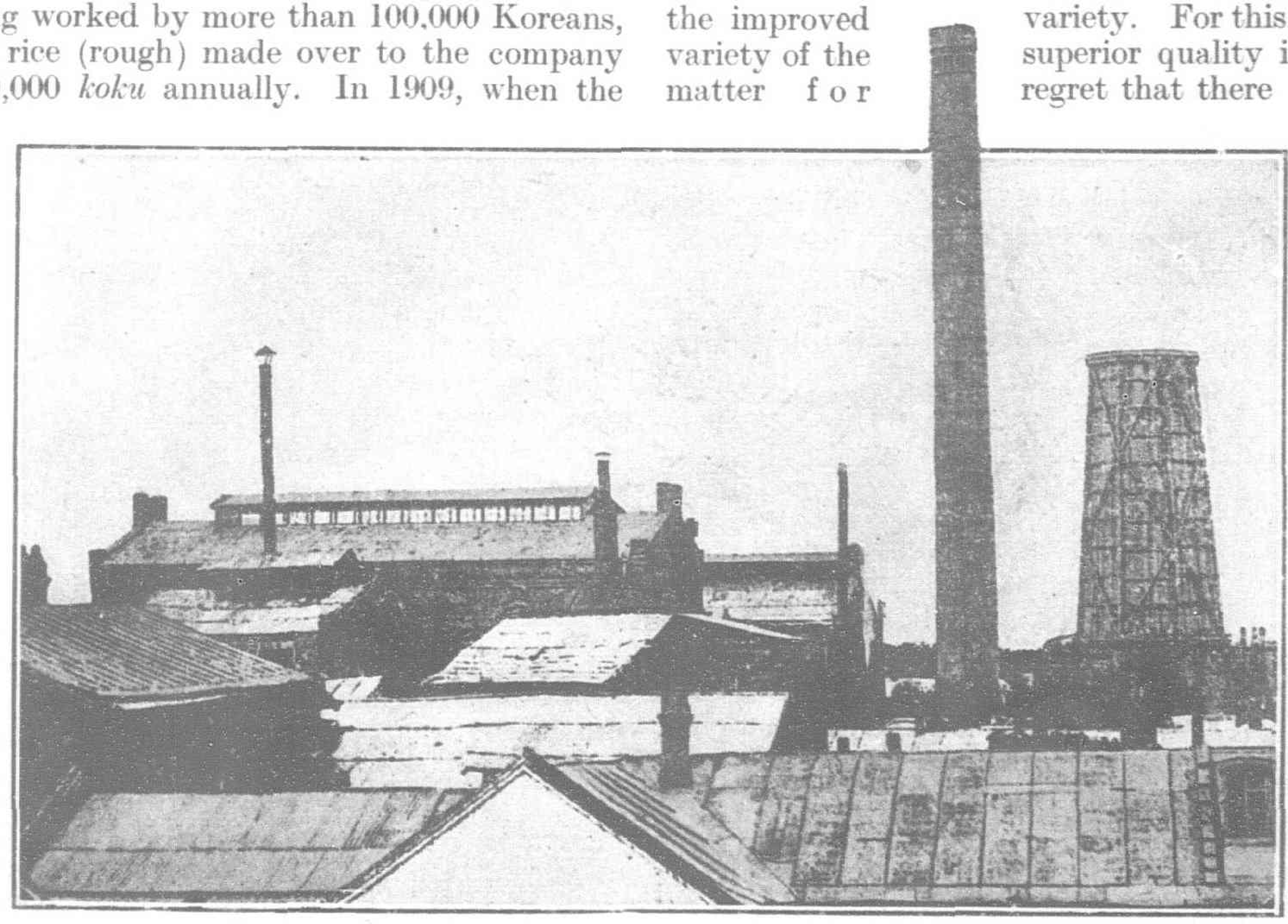
With the exception of the land under the company's direct control the fields are being worked by more than 100,000 Koreans, and the total amount of rice (rough) made over to the company as rent reaches over 300,000 *koku* annually. In 1909, when the company started its agricultural enterprise, the industry in Korea was only in its infancy, and there were few men who could utilize modern methods.

Thereupon, according to the administrative policy of the government, the company, devoted itself to the improvement of agriculture. The Korean farmers of those days, however, were so conservative that they clung doggedly to the old farming methods. It was a very hard task to instil the idea of agricultural improvement into the farmers, but the company continued to exert their efforts in guidance and encouragement. As a consequence, those who adopt improved agricultural, methods have increased yearly. In view of the trend of times the company planned to adopt intensive methods in place of uniform methods of cultivation, according to the local conditions. In some districts the company's experts, who are leading the farmers to effect the improvement, gratifying results are being obtained, though the plan has been in force for a very short time.

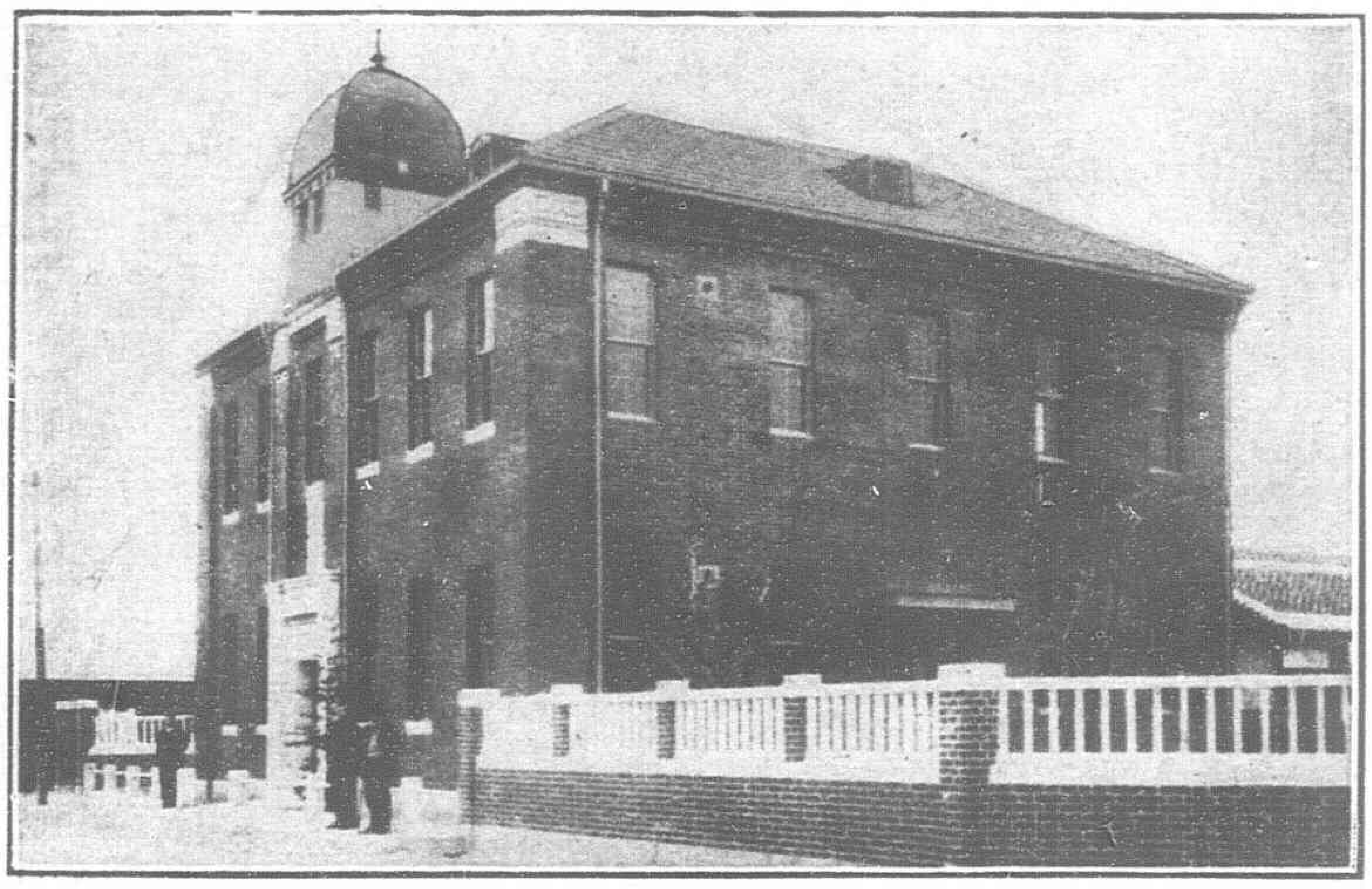
The Improvement of Rice

When the enterprise was started by the company, it was considered most important to distribute the improved variety of rice, and for this purpose, they made an effort, in co-operation with the government authorities. In 1910, seed fields were established in principal districts, and the seed-rice produced have continued, to date, to be distributed among the company's colonists and tenant-farmers. Eighty per cent. of the tenant-fields to the south of Keijo (Seoul) use these seeds, while over 30 per cent. of the fields in the Western Korea use them. In some parts of the Western Korea, there are fields, soil of which is not adaptable to the improved variety. For this kind of field, the ordinary variety of the superior quality is used. However, it is a matter for regret that there are still many Korean tenant-farmers who are indifferent to agricultural improvement. Fearing that conditions will degenerate if left to the farmers alone, the company has distributed the seed rice and has continued to maintain its improvement, aiming at the enhancement of the reputation of Korea-grown rice. Every attention is being paid by the resident experts in various places who manage the fields. The total amount of seed-rice distributed by the company reaches 15,000 *koku* annually.

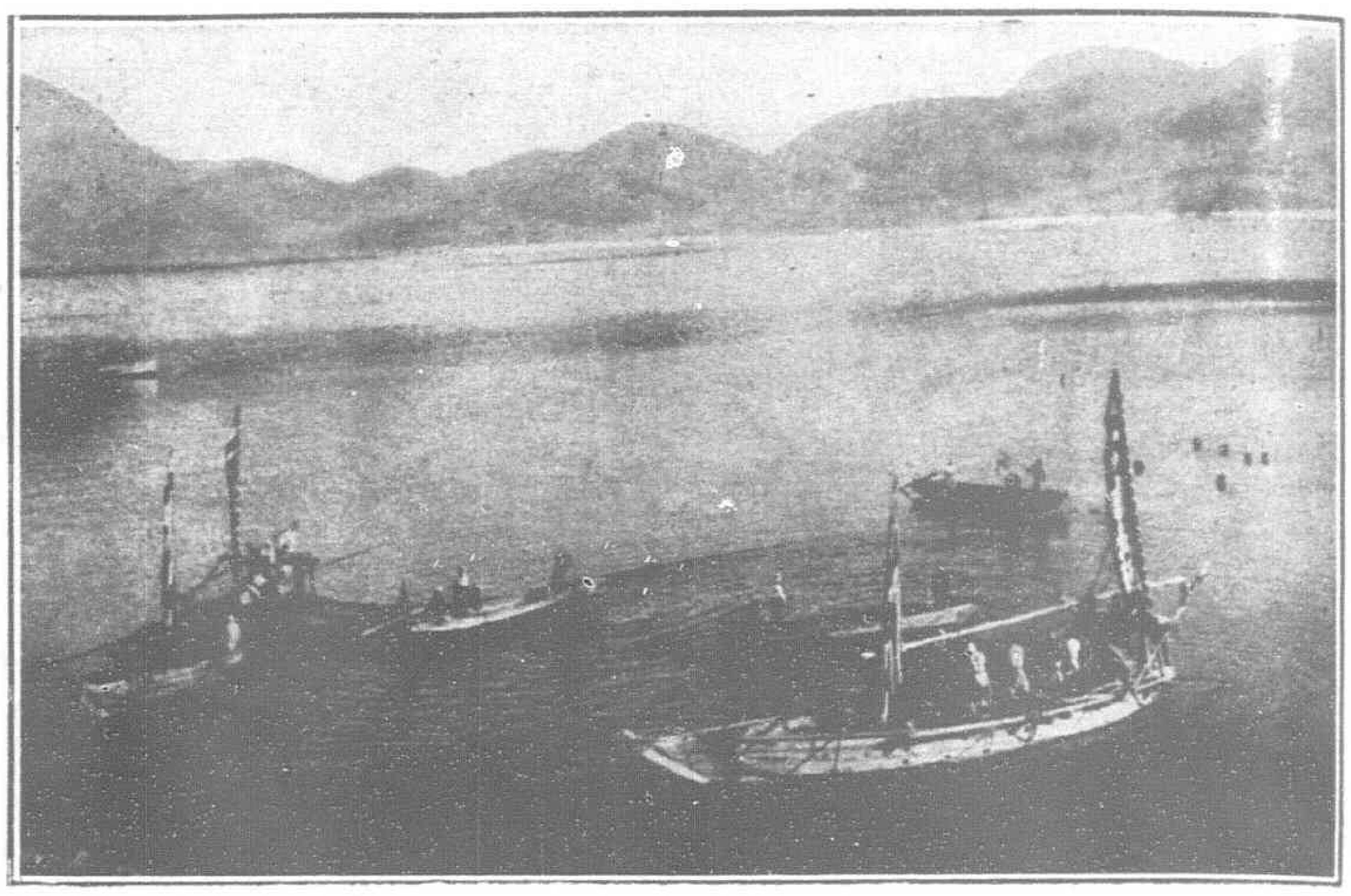
In the fields of Korea, which have long been employing crude



Power House of North Manchuria Electric Co.



Headquarters of the Union of Financial Associations



The Return of the Sardine Fleet

fertilizing methods, the application of artificial fertilizer together with irrigation is most important in bringing an increase to rice crop. But most of the farmers were not accustomed to the use of the modern fertilizers. In the beginning, the company used to distribute the fertilizers only to their colonists and the tenant-farmers, but since 1919, they began to distribute the article to all the farmers. During the past five years, the company has distributed over 1,300,000 pieces of bean-cake, a large quantity of superphosphate of lime and oil-cake amounting altogether to about Y. 5,000,000. To-day, Korean farmers who use the fertilizer are yearly increasing in number with growing demand.

The improvement of the Korea-grown rice is now fairly effected and the quality is almost not inferior to that of home-grown rice. However, the defective points of the former are that they are not properly dried and prepared, particularly suffering from small stones being mixed in it. To remedy this condition the company has loaned rice-threshers, straw mats and winnowers so that the farmers can sift the mixtures. As regards the betterment of drying and preparation, the company is now encouraging the farmers by means of prizes and by other methods. To effect the improvement, it is necessary to let land-owners and tenant-farmers realize their own advantage. The company yearly exports a considerable amount of rice to Japan, and in both eastern and western markets the improvement of Korean rice has been recognized.

The resident experts show the farmers the methods of selecting variety, rice planting, manuring, weeding, etc., and the company commends publicly those who have shown good results in cultivation. In case of drought or flood, the farm-rent is decreased or they are exempted according to the degree of damages suffered. The tenant-farmers are hired for engineering work of the company. In 1918, when there was a heavy drought, the company loaned the seed of home-grown potatoes to the tenant-farmers and the peasants in the company's district to provide against the calamity. In 1922, when several places north of Keiki-Do, particularly the direction of Kokai-Do were visited by flood, the company contributed a large amount of money for the maintenance of the cultivated lands in these districts, besides donating money and cereals to the sufferers.

The company, from time to time, hold lecture meeting on agricultural affairs and exhibitions of agricultural products. Besides giving practical guidance, the agricultural experts make every effort for promoting the industry.

Tenant-troubles which are increasing in Japan now occur also in Korea, although not so frequently. According to the investigation made by the government, there have been only 71 cases during the past three years, the figures corresponding to about one-thirtieth of Japan. The troubles generally originate in the request for lessening of farm rent, or cancellation of tenant-rights, or a demand that land tax should be paid by the land-owners. But the fundamental cause is, on the whole, the fact that the farmers are in straightened circumstances. In view of this fact, the company is trying to elevate their economic condition, encouraging the improvement of cultivating methods and the provision of some occupation in addition to farming.

The Improvement of the Variety of Soya-Beans

The climate and soil of Korea are adaptable to the cultivation of soya-bean, but the farmers do not care much about this crop. With a view of improving the quality and standardizing the varieties, the company established a soya-bean nursery and is distributing the seeds gathered to its tenant-farmers.

As the paddy-fields of Korea mostly depend upon rain-water, the annual amount of crops differs according to the seasonable condition of the year. Even such fields, if equipped with irrigation and well managed, may be converted into fine ripe fields. There are many barren lands almost everywhere. Particularly in the whole region along the Yellow Sea, beaches are found here and there awaiting the reclamation. It is pressing need to improve or reclaim those lands from the view of management of land and also of the solution of the food problem. The company will finance such enterprise and also undertake the survey. The following show the irrigation and reclamation works completed and under construction:

Irrigation Undertakings

The works completed under the company's direct management

Description	Location	When Completed	Irrig'd Area *chobu*
Pumping irrigation works Kiusan-men	Rashu-Gun, Zenra-Nando	Dec., 1916	270
Land-improvement work at Josei-Men	Ryosan-Gun, Keisho-Nando	June, 1917	80
Pond-reclamation work at Hochu	Rashu-Gun, Zenra-Nando	Aug., 1917	12
Construction of a reservoir and a water-way at Saishi-Men	do.	Aug., 1919	315
Land-improvement work at Daichi-Ri	do.	July, 1919	7
Irrigation-improvement work at Unkoku-Ri	do.	June, 1922	21
		Total *chobu*	705

The organization of irrigation associations was mainly due to the company's efforts. To-day, there exist 55 associations, the irrigated area of which aggregating to about 117,030 *chobu*. Of the total acreage, nearly one-half is being improved into excellent well-irrigated fields. The company owns fields of 14,217 *chobu* in area out of the total irrigated acreage:

(*a*) Irrigation Associations organized

Name	District	When Completed	Total Irrig'd Area *chobu*	Irrig'd Area of land owned by the Company *chobu*
Kanan	Kaya, Hoshu, Daisan, Kanan-Gun, Keisho-Nando	Mar. 31, 1922	1,269	34
Kato	Kato-Men, Kinkai-Gun Kanan-Gun, (Keisho-Nando)	Mar. 31, 1921	699	65
Taisan	Taisan-To-Men, Shogen-Gun (same as above)	Oct. 10, 1921	1,224	112.4
Jonan	Jonan-Men, Mitsuyo-Gun (same as above) ...	Sept., 1918	240	6

Name	District	When Completed	Total Irrig'd Area *chobu*	Irrig'd Area of land owned by the Company *chobu*
Kinkai	Kinkai, Garaku-Men (same as above) ...	May 11, 1916	1,997	198.1318
Taisha	Taisha-Men, Kinkai-Gun (same as above) ...	July 30, 1917	1,868	236
Tosen	Tosen-Men, Shonei-Gun (same as above) ...	Aug. 31, 1921	147	.7
Mitsuyo	Jonan-Men, Mitsuyo-Gun (same as above) ...	Nov., 1906	642	6
Ryosan	Toryosan, Joseimen, Ryosan-Gun (same as above)	June, 1923	1,170	170
Tomen	To-Men, Shogen - Gun, (Keisho-Nando) ...	Nov., 1922	986.69	5
Shodo	Shodo-Men, Mitsuyo-Gun (same as above) ...	Mar., 1923	431	2
Geinichi	Ennichi, Taisho, Keisan-Men, Geinichi-Gun (Keisho-Hokudo) ...	Aug., 1916	1,411	65.5
Fumon	Naito, Keishu-Men, Keishu-Gun, (same as above)	July, 1922	381.0808	61
Ekiyoku	Sanrei, Zenshu-Gun, Ekisan, Gosan, Ekisan-Gun, Taiya, Kaisei, Gyokusan, Bei, Kyuyu, Yokuko-Gun (Zenra-Hokudo)	One part on April, 1915 One part on July, 1914	9,000	785
Rineki	Kotohokuichi, Ekisan-Gun, Zuisuirinpa, Taiya-Men, (same as above)	May 30, 1911	3,326.5927	204.9026
Zeneki	Shunpo, Ekisangun, Sanrei-Men, Zenshu-Gun (same as above) ...	Feb. 28, 1911	1,445.80	22.8113
Kofu	Kotoku, Seinai, Kosho-Gun Kofu, Eigen, Seiyu-Gun Hoan, Kansen, Shusan, Funei, Toshin, Hakusan, Fuan-Gun (same as above) ...	April, 1919	4,000	1,113.4703
Ryushin	Ryushin-Men, Zenshu-Gun Enchu, Ryuko, Unkokuri, Zenra-Hokudo	1924	170	3.5014
Yokuko-Seibu	Bei-Men, Yokuko-Gun Zenra-Hokudo ...	Mar., 1908	460	6.0622
Bakyuhei	Tenseki-Men, Ronsan-Gun, Chusei-Nando ...	Aug. 31, 1909	320.6408	24.2008
Meigantei	Shishu-Men, Seishu-Gun, Chusei-Hokudo	July 28, 1920	164.8709	3.3019
Girinchitei	Teisen-Men, Teisen-Gun Chusei-Hokudo	Dec. 20, 1915	291	28.9309
Ankaku	Kakujo-Men, Anso-Men, Anpen-Gun, Kankyo-Hokudo	May, 1923	900	35.800
Choshitei	Usan, Suigen-Gun, Keikido	Mar., 1919	64.0813	3.7425
Reika	(same as above) ...	Dec. 20, 1919	245.2614	64.1306
Oun	Heiko-Gun, Tetsugen-Gun, Kogendo ...	June, 1921	557	9.6314
Chuo	(same as above) ...	in 1924	8,630	57.8728
Fuhei	Fuhei-Gun, Kimpo-Gun, Keikido	Expected to be completed by April, 1925	3,601.2522	52.9828
Dojin	Taiden-Men, Teishu-Gun, Sei-Men, Hakusen-Gun, Heian-hokudo ...	Mar., 1923	4,000	46.1521
Taisho	Gaika-Men, Ryusen-Gun, Heian-Hokudo ...	Oct., 1917	5,989	30.8600
Hakusen	Kanan-Men, Hakusen-Gun, Heian-Hokudo ...	Expected to be completed by Dec., 1927	2,928.6	7.2
Total 31 Associations		*chobu*	58,560.8911	3,462.3413

(*b*) Irrigation Associations Under Organization

Name	District	Probable Date of Completion	Total Irrigated Area *chobu*	Area of land owned by the Co. *chobu*
No. 2	Kanan Kanan-Gun, Keisho-Nando ...	—	596	23.6
Kanan	Mitsuyo-Gun, Keisho-Nando	—	1,852.6	80
Tokuto	Kinkai-Gun, Keisho-Nando	—	890	85
Senshinj	Kato-Gun, Keisho-Nando	—	308	150
Nihoku	Kinkai-Gun, Keisho-Nando	—	600	9
Reinan	Shonei-Gun ,,	—	1,050	20
Jujo-Men	Tatsujo-Gun, Keisho-Hokudo	Aug., 1923	400	35
Josen	Josen-Gun, Chusei-Nando	—	3,100	425.5617
Togantei	Seishu-Gun, ,,	—	229	5.75
Kiganmen	Fuso-Gun, ,,	—	205	22
Shunryu	Teihei-Gun, Kankyo-Nando	—	1,000	23.3
Rankoku	Waiyo-Gun, Kogendo...	—	500	50
Ichisan	Koyo-Gun, Keikido ...	—	2,360	68.8329
Suiryu	Suigen-Gun, Ryujin-Gun, Keikido	—	819	69.3419
Yuishiton	Hozan-Gun, Koshu-Gun, Kokaido ...	—	4,650	1,171.7516
Enkai	Enpaku-Gun, Kaishu-Gun, Kokaido ...	—	10,260	2,128.8623
Keiyukyu	Tainei-Gun, Kokaido...	—	4,000	2,090
Shinsen	Shinsen-Gun, Tainei-Gun Kokaido	—	6,000	1,420
Junnan	Junsen-Gun, Heian-Nando	—	2,000	34.4525
Kosei	Kosei-Gun, ,,	By Mar., 1927	1,290	13.5204
Toshinko	Seiyu-Gun, Zenra-Hokudo	—	1,200	2,191
Kogen	Kogen-Gun, Kankyo-Nando	—	1,213	500
Gishu	Gishu-Gun, Heian-Hokudo	—	2,350	38
Jotomen	Ronsan-Gun, Chusei-nando	—	800	100
Total 24 Associations		*chobu*	58,472.6	10,755.0012

(*c*) Irrigation Work done Under the Direct Management of the Company

Name	Location	When Completed	Irrigated Area *chobu*
Taisen	Kijogun, Taisen, Heian-Hokudo...	Oct., 1916	973

WORKS COMPLETED

Name	District	When Completed	Area *chobu*
Choanhei	Koyo-Gun, Keikido	June, 1915	371
Raganri	Ekisan-Gun, Zenra-Hokudo	Sept., 1916	149
Sujimmen	Koyo-Gun, Keikido	May, 1919	6
Ryuko	Ryuko-Gun, Heian-Nando	May, 1921	141
		Total *chobu*	667

WORKS UNDER CONSTRUCTION

Name	District	When Completed	Area *chobu*
Jiboho	Muan-Gun, Zenra-Nando	Expected by the end of 1923	266

WORKS FOR WHICH SURVEY AND DESIGN HAVE BEEN MADE

Name	District	When Completed	Area *chobu*
Reigan	Reigan-Gun, Zenra-Nando	—	838
Ranpo	Ranpo-Gun, Chusei-Nando	—	318
Koyo	Koyo-Gun, Junten-Gun, Zenra-Nando	—	535
Kaigetsu	Enpaku-Gun, Kokaido	—	2
Kotomen	,, ,, ...	—	1,175
Tensenri	Zuisan-Gun, Chusei-Nando	—	435
		Total *chobu*	3,303

In addition, there are seven more places under application, the total area being 8,481 *chobu*. For the men of enterprise who have not sufficient funds or who can not carry out their scheme themselves, the company is ready to do every thing to help them.

THE MANAGEMENT OF FORESTS

The company observed that the improvement of forest and river in the peninsular is very important from the standpoint of its industrial expansion. Besides planting trees, they started an investigation into the plantation districts. In March, 1911, the company could loan a part of state-owned forest and bought up several privately-owned forests. Since then, steady extension has been made. The total area of the forest managed by the company to-day reaches over 61,934 *chobu*. A description follows :

Name of Do	Total Area *chobu*	State-owned forest rented by the Co. *chobu*	Forest bought up by the Co. *chobu*
Keiki ...	10,986.8629	7.2100	10,979.6529
Kogen ...	1,198.9126	270.	928.9126
Kankyo-Nan	22,339.3226	22,310.2509	29.0717
Kankyo-Hoku	6,773.0900	—	6,773.0900
Kokaido ...	18,349.7220	16,651.6000	1,698.1220
Heian-Nan	61.2916	—	61.2916
Heian-Hoku	75.1200	—	75.1200
Keisho-Nan	876.4004	—	876.4004
Keisho-Hoku	142.5708	—	142.5708
Zenra-Nan ...	1,112.4208	—	1,112.4028
Zenra-Hoku	—	—	—
Chusei-Nan ..	15.3420	—	15.3420
Chusei-Hoku	3.1521	—	3.1521
Total *chobu*	61,934.2318	39,239.0609	22,695.1709

In principal forestry districts are the company's men who watch and protect, while the local men of influence also take care of the forest in co-operation with them.

In 1910, the company first had nurseries in the six districts namely, Tokugen, Bunsen and Anpen Guns of Kankyo-Nando, Joshin-Gun of Kankyo-Hokudo, Yohei-Gun of Keikido and Hozan-Gun of Kokaido, the total area being 19,027 *tsubo*. In the spring of 1923, the number of nursery trees produced aggregated to 868,540, and after 1924, it is expected to obtain there annually more than 1,100,000 even which number is not sufficient to meet with demands.

Besides nursing natural young trees, the districts are artificially afforestated. Up to the spring of 1923, the districts covering an area of over 7,066 *chobu* which have been planted with trees numbering 19,220,000. Below is given the variety of the trees planted :

Name	Area of Nursery *chobu*	Number of Trees planted
Sawshaped Oak	2,248.2519	7,422,969
" Nise-Acassia "	174.4903	760,430
Alder	2.7705	8,325
Chestnut	657.3300	1,354,930
Larch-tree	3,306.7000	8,201,065
" Keyaki "	84.5000	93,976
" Akamatsu "	583.0500	1,357,170
" Kuromatsu "	3.4400	10,200
Walnut	5.6400	6,455
Total *chobu*	7,066.1727	19,215,520

Of these, sawshaped oaks have been planted mainly in the Kokaido districts, while the regions in Kankyo-Nando have had larch-trees planted, the total number of trees planted amounting to over 5,357,000. As the company was a pioneer in forestry in Korea, they are now experienced in afforestation. Their success was recognized by the government who have transferred forest covering 865 *chobu* in area to them. As most of the trees planted are to-day 8 or 9 years old, afforestation efforts will be completed in the near future. In view of the increase of forest areas and also of the result in afforestation, they are planning to manage the undertaking more economically, while they are carrying out a scheme newly drawn up to meet with the requirements.

The soil of Southern Korea is suitable for the growth of bamboo. Nevertheless, there are few who adequately manage the groves, with the result that they are wasted. The companies, therefore, encourages the local people to improve the condition. To increase the amount of production to meet with commercial demands and also to promote industry in this direction, they took over bamboo groves in the districts of both Keisho-Nando and Zenra-Nando. Since 1911, the groves under the company's management have increased in area which now covers 281 *chobu*, the work so far being carried out very successfully.

COLONIZATION ENTERPRISES

The company invite colonists for the development of agriculture in Korea. The colonists are divided into the two classes: the first being the independent farmer, who cultivates fields covering less than two *chobu* transferred to him by the company, while the second is the land-owning farmer who has a ripe-field covering less than 10 *chobu* in area transferred by the company and who lets the fields to the farmer-tenants except one part which he cultivates himself. In addition, though not a large number, there are colonists who cultivate fields while they fish, these belonging to the first class mentioned above. The company used to encourage both classes of colonists, but since 1921, they stopped to receive application for the first class colonists, as the people of this class are apt to threaten the tenant-right of Korean farmers. They are now encouraging the immigration of the so-called land-owning farmers to each of whom about 5 *chobu* area of field is transferred by the company. It is the principle of the company to invite colonists of good character rather than to have larger numbers of them. The following shows the number of houses of the colonists with its population :

Name of Do	Farmer or Fisher	Classes	March 1920 Number of Houses	1920 Pop.	March 1921 Number of Houses	1921 Pop.	March 1922 Number of Houses	1922 Pop.
Keiki	Farmer ...	1st	602	2753	616	2825	593	2800
		2nd	16		19		34	
Chusei-Hoku	Farmer ...	1st	17	63	16	70	16	67
		2nd	3		3		1	
Chusei-Nan	Farmer ..	1st	316	1290	322	1225	289	1321
		2nd	11		16		21	
Zenra-Hoku	Farmer ..	1st	589	2475	568	2185	537	2547
		2nd	23		33		37	
Zenra-Nan	Farmer ...	1st	657	3120	681	2377	651	3367
		2nd	20		31		47	
Zenra-Nan do.	Semi-farmer Semi-fisher	1st	46	239	44	208	44	208
Keisho-Hoku,	Farmer	1st	457	2118	467	2235	450	2273
		2nd	13		18		21	
Keisho-Nan,	Farmer ...	1st	595	2903	604	2997	589	3121
		2nd	14		20		36	
do. do.	Semi-farmer Semi-fisher	1st	85	338	85	365	85	370
Kokai,	Farmer ...	1st	438	1848	456	1669	443	1632
		2nd	15		25		36	
Heian-Nan,	Farmer ...	1st	8	32	7	27	—	—
Heian-Hoku,	Farmer ...	1st	6	28	6	28	6	27
Kankyo-Nan,	Farmer ...	1st	10	58	12	64	11	64
		2nd	1		1		1	

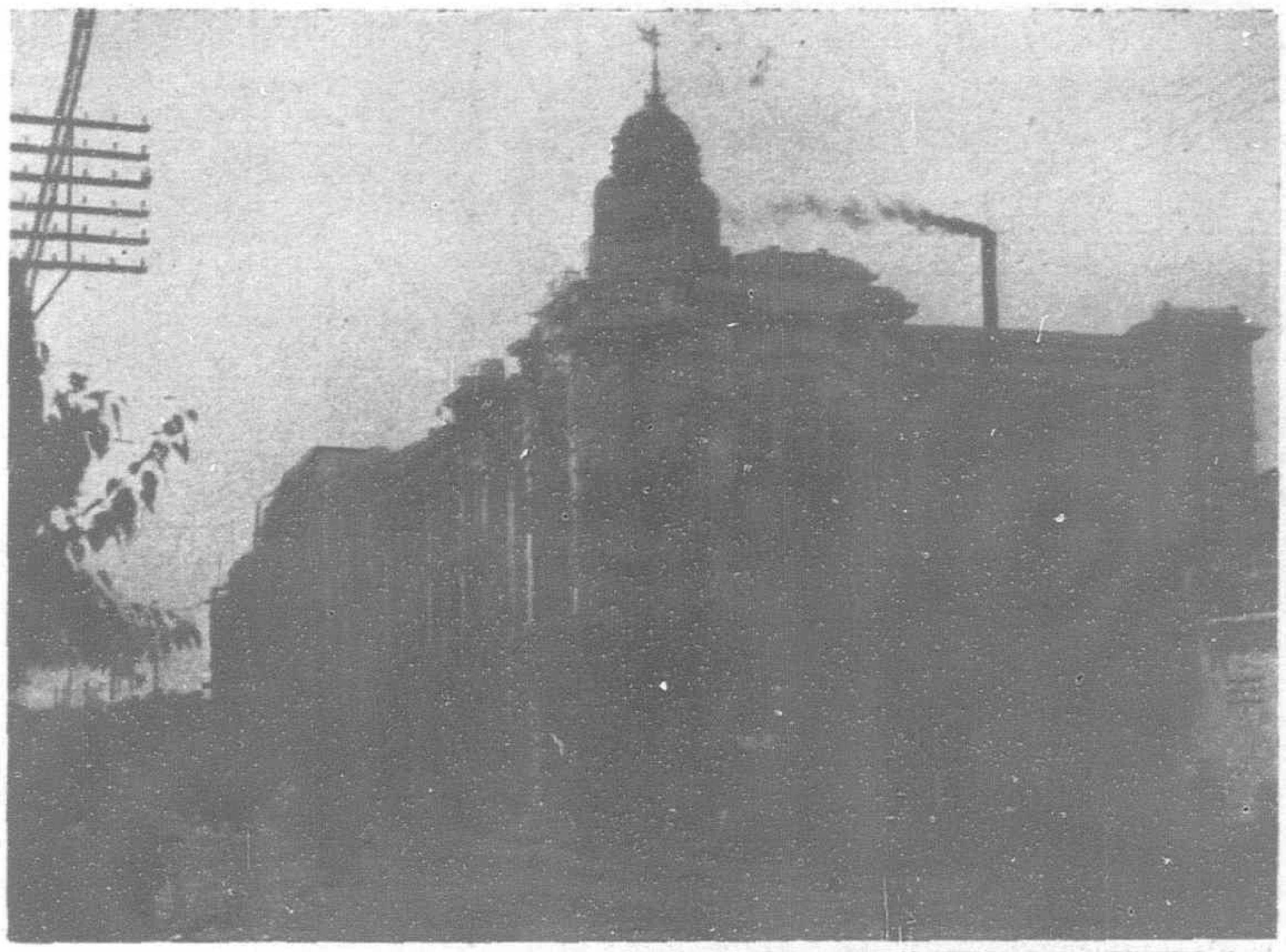
The majority of the colonists cultivate rice fields but in some district, they cultivate fruit and vegetables. As to the land transferred, the first class colonists have a field with the area of about 1 *cho* 8 *se* and a farm of 1 or 2 *tan* on both of which they work themselves. To the second class of independent farmers, the land of no more than 10 *chobu* is transferred, besides which they can have the allottment of a field of about 8 *cho* 5 *tan* and a farm of about 8 *tan*. The second class of colonists have an allotment of a field of about 4 *cho* 6 *tan* area and farm of about 5 *tan* area. There are now about 4,000 houses of colonists who are showing good results, though some of them lose because of climatic conditions. Among the first class colonists, there are some who are idle but live at ease, letting the Korean tenant-farmers work on their own fields. Against such people, the company takes steps to cancel their contract. At the agricultural shows held in various places, many of the colonists have been awarded prizes. Most of the second class colonists are farmers of the propertied class or intelligent class who take the lead among the farmers of their district. The colonists, half-farmer and half-fisherman are found only in Keisho-Nando and Zenra-Nando. In Kosanson, Keisho-Nando and other places, there are good fishing villages, but the inhabitants rather take to agriculture as their occupation than fishery, as larger funds are needed for the equipment for the latter. In recent years, most of the farmers have begun to have some occupation subsidiary to farming. They manufacture ropes and straw-bags.

FINANCING THE BUSINESS OF THE COMPANY

Up to 1916, the company made loans amounting to about Y. 5,000,000.00, but since the fiscal year of 1921, a steady growth has been made, reaching over Y. 44,000,000. The figures correspond to about 200 times as against Y.220,000 which they loaned they started. The following table shows the amount of loans accommodated by the company up to the end of March, 1922 :

(*Continued on page 242*)

Commercial School, Eastern Railway Guard, Harbin



North Manchuria Electricity Co., Harbin

Manufacturing Industries of North Manchuria

LONG before the advent of the Russians, prior to the construction of the Chinese Eastern Railway, raw materials were worked in North Manchurian manufacturing enterprises, and the production of articles of food occupied then, as it does now, the most important place. Small flour mills, hanshin distilleries, beer breweries, vermicelli plants, bean oil mills—these almost exhaust the list of native industries in North Manchuria, unless mention be made of home industries and handicrafts.

The above branches of industry were also the first, and continue to be the main undertakings in which enterprising Russians are engaged. These Russians constructed roller mills, distilleries, and a number of other enterprises, with the native end in view of preparing local raw materials for the consumption of the local market.

The arrival of the Russians introduced, of course, new demands and new methods of production which differed from those practiced by the natives. This, however, by no means changed the situation as described by us. Even the Russo-Japanese War, which played a most important role in the development of Manchurian industry, was not able to change it. The Russian troops had only a quantitative influence upon the market, the character of which had already been determined by the railway population.

The construction of the railway, and the influx of a permanent Russian population, were, no doubt, the primary causes for the introduction of manufacturing industries of European type.

In the undeveloped and desolate country this new population could find but little which in its native form was satisfactory to a European palate. The Russians, at first by necessity compelled to consume Chinese flour and Chinese spirits, soon organized their own enterprises, and, as is always the case with pioneers, once the difficulties of the beginning are overcome, were rewarded with handsome profits. The construction of the railway was attended by an abundant inflow of money paid to contractors, suppliers and others, and assisted settlers in the railway zone to accumulate capital. This, of course, facilitated the development of industries.

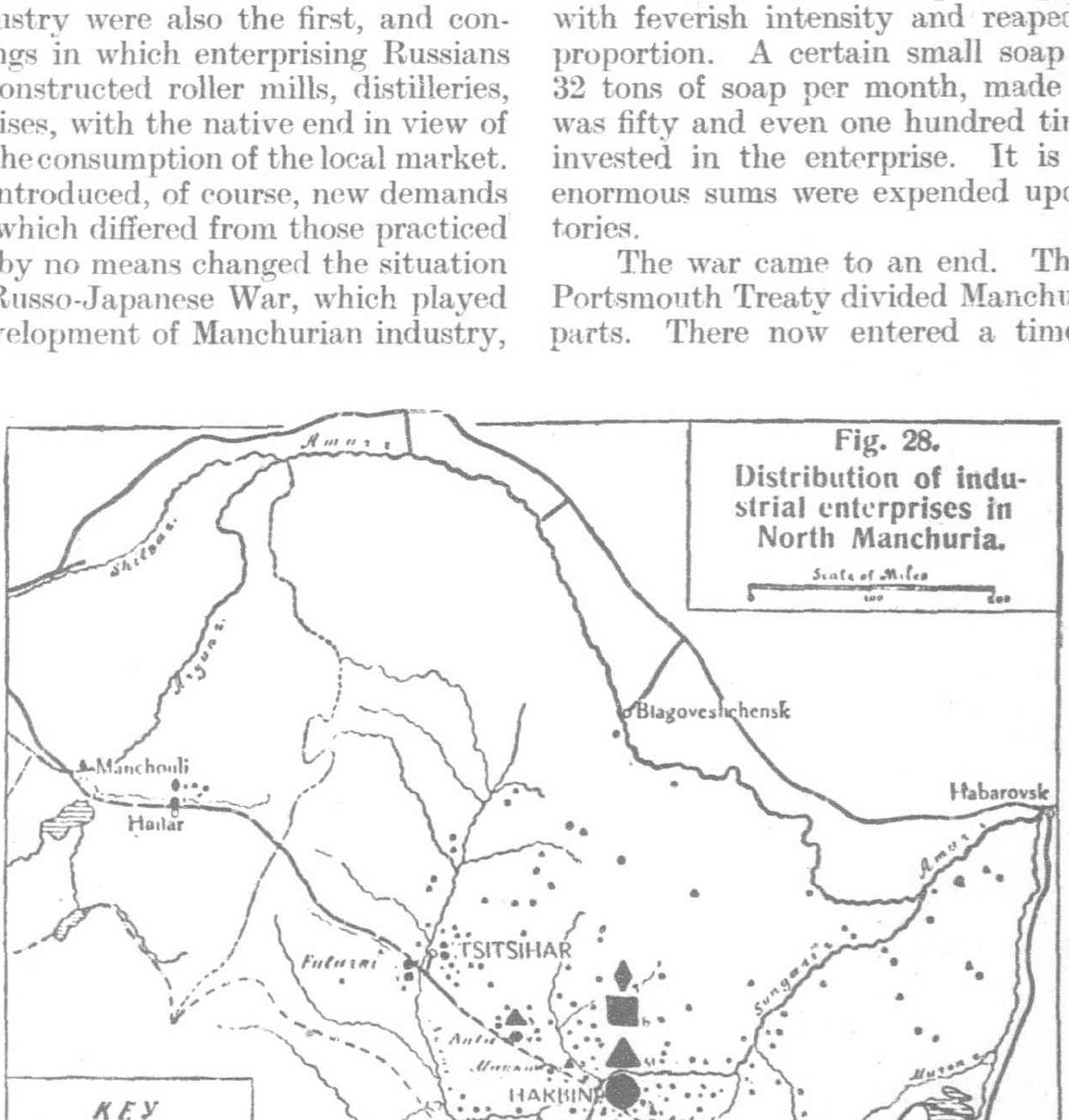


Fig. 28.
Distribution of industrial enterprises in North Manchuria.

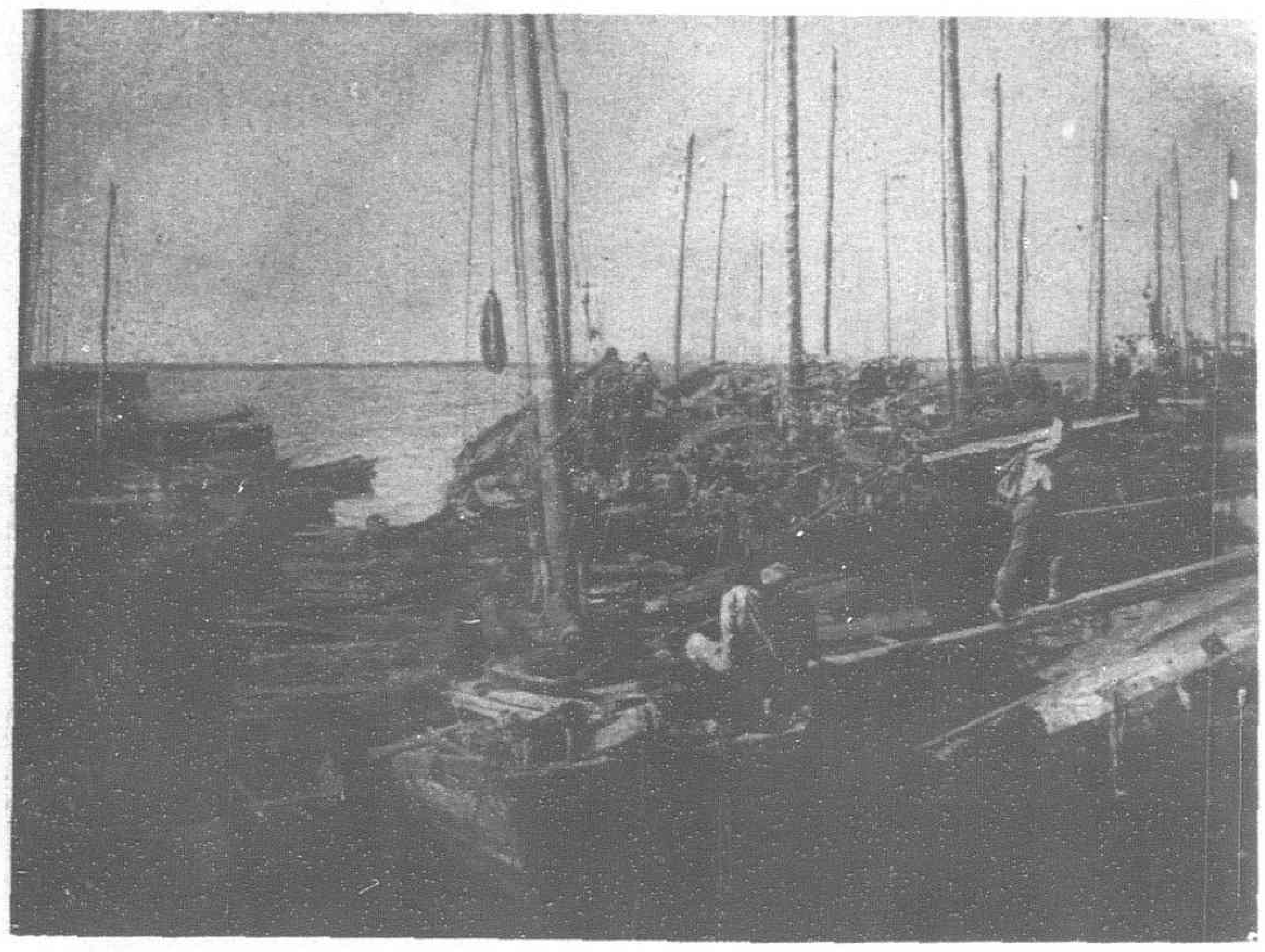
Distribution of Industries, etc.

Another, and larger, money wave rushed into Manchuria with the armies during the Russo-Japanese War. Demands of the armies were practically inexhaustible, and prices charged were incredible. Manufacturing enterprises existing at the time worked with feverish intensity and reaped profits which were out of all proportion. A certain small soap factory, producing from 24 to 32 tons of soap per month, made a net profit in one year which was fifty and even one hundred times above the capital originally invested in the enterprise. It is not surprising, therefore, that enormous sums were expended upon the construction of new factories.

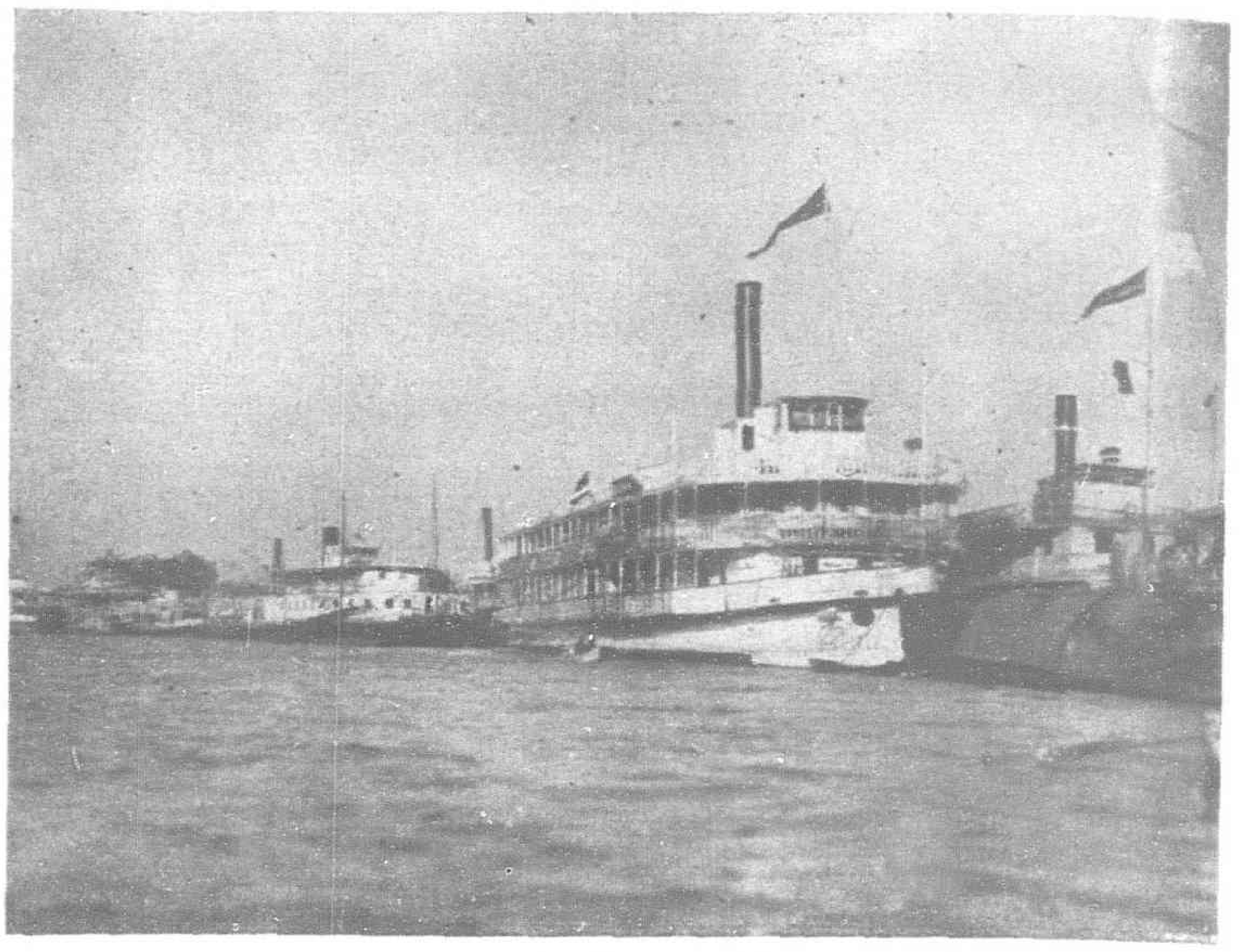
The war came to an end. The armies were evacuated. The Portsmouth Treaty divided Manchuria into two practically separate parts. There now entered a time of a severe crisis, a difficult and protracted period of adjustment to new conditions.

An epidemic of bankruptcies broke out, alarming even those who succeeded in coming out more happily from the fray. Many sold all their movable property, and left the country in the wake of the armies, carrying with them their accumulated capital. Manufacturing plants were of necessity forced to remain behind. These now became subject to the struggle for adjustment.

It immediately became evident that the local market could not absorb the entire output of existing plants. Fall in prices made it essential that industries be reorganized, and that running expenses be brought down to a normal level. In the general confusion brought on by the crisis, and because bills were not paid, working capital



Firewood Boats in the Sungari



Along the Sungari, Harbin

disappeared. Finally, and this is perhaps the most important consideration, local raw materials, upon which these industries depended, became articles of export to the world markets. Prices on these raw materials, which the war had caused to rise, therefore fell to a lesser degree than did prices on manufactured articles. The gap between these two narrowed. The unhealthy crisis brought on by the ending of the war thus assumed a long drawn out, chronic character, and is known as the second phase in the development of manufacturing industries in North Manchuria.

The period already described, covering the time from the establishment of the first enterprise of European type to the end of the Russo-Japanese War, may be referred to as the first phase. This is the period when Manchurian economy maintained an isolated position, and when manufacturers monopolized not only the market of raw materials but of the finished products as well. The extreme moment of this first phase, although accidental in nature, was the war, which made it possible for manufacturers to take the greatest possible advantage of their position.

The characteristic trait of the second phase, as differing from the first, is the establishment of a permanent and solid connection between North Manchuria and the world markets. Manchurian raw materials, which previously had been at the exclusive disposal of local manufacturers, now emerged from under the monopolistic influence of the latter, and, primarily, became articles of export. The priority in the establishment of prices was transferred to the principal centres of world commerce, but this, neverthless, did not bring firm prices to Manchuria. As a new country it remains subject to every chance, and exercises an influence over its own economic life which in countries that are stronger financially and economically more developed is not observed and even unknown. Political events, currency rates, brigand attacks on trade routes, harvests, fluctuation in taxes and dues, individual transactions of large exports—all these influence local prices and local commerce, to a degree which is out of all proportion to the actual cause. The spirit of speculation brought on everywhere by the world war, and the germ of which has always been present in Manchuria, made itself felt. There is no doubt but that this was harmful to the development of industries. This speculative tendency became particularly evident in the transactions of exporters of raw materials. Exporters, who operate with large capital, principally foreign, and supported by foreign banks, have always occupied a commanding position on the local raw materials market. Export transactions upset the calculations of manufacturers, and they introduced into the distinct, methodical and permanent struture of manufacturing an element of speculation and stock-broking which is foreign to the same.

Manufacturers, on their part, endeavored to fight as best they could, but victory remains even at the present time for them an alluring hope for the future only. There was much lacking, even as there is now, in the essentials of success for them. There did not and does not exist among them the necessary solidarity which is the result of a consolidation of interests. There were to be found none of those manufacturers' associations so common in Europe and America, which unite enterprises according to the nature of their products. There was, consequently, no possibility of concerted action.

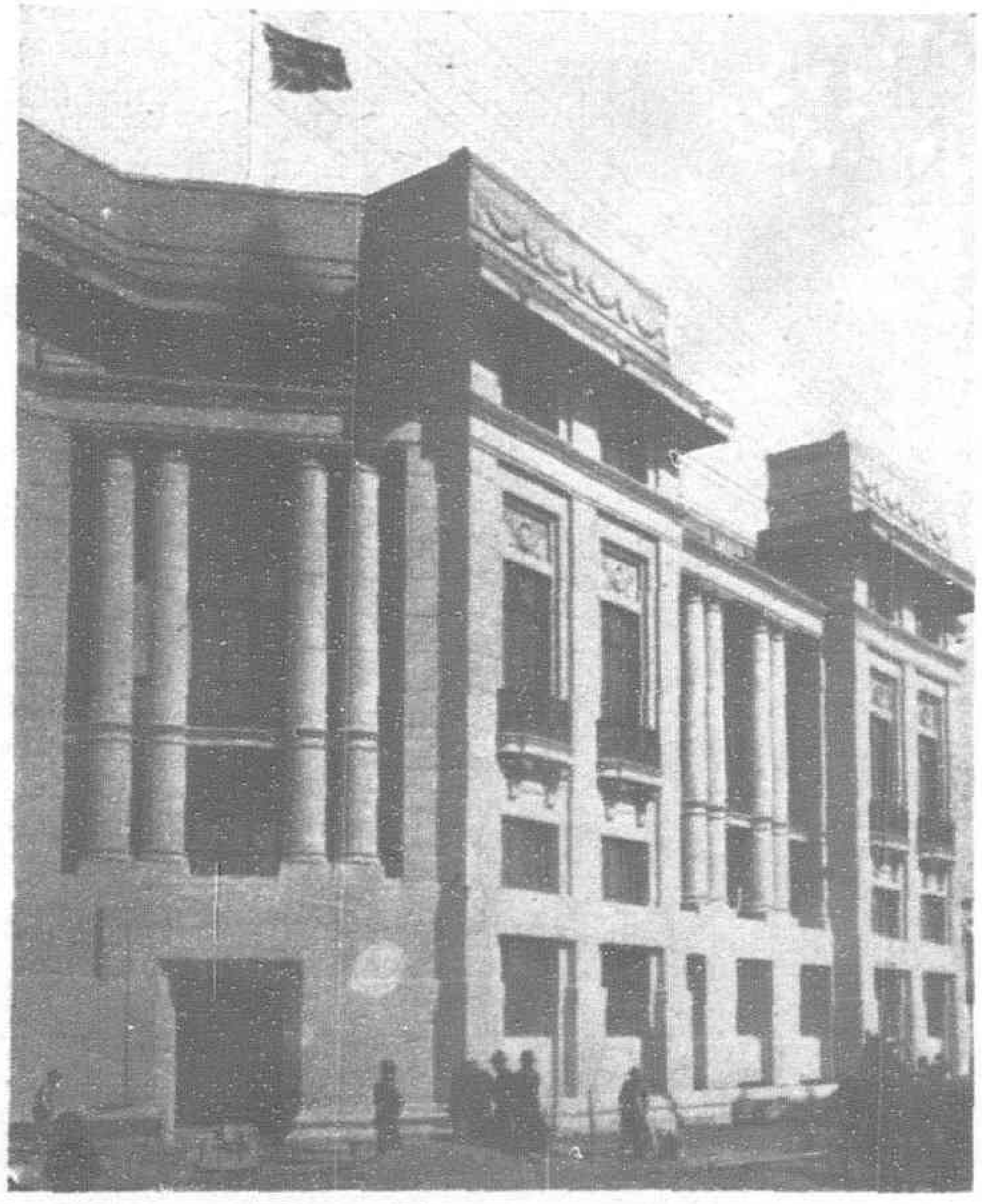
The Harbin Exchange, founded in 1907, filled this want only in part. It is true that the Harbin Exchange Committee often defended the interests of Harbin industries before the Administration of the Railway, but it at the same time also defended the contrary interests of exporters. Representatives of North Manchurian industries at one time argued at Petrograd that the fundamental economic policy in Manchuria must be the encouragement of the development and strengthening of the local manufacturing industry, and that, on the other hand, support for the export of raw materials was premature.

Petrograd at times responded more or less sympathetically to these declarations. In the final analysis, however, the basic contours of the program introduced in Manchuria were drawn without regard to the interests as formulated by Manchurian manufacturers, and even without regard to the economic life of the zone of the C. E. R. as a whole, becoming merely part of the large and complicated governmental policy of the Empire.

In the meantime the process of the economic development of North Manchuria proceeded along its course, and the export of cereals grew to imposing dimensions.

The manufacturer was compelled to have large funds available in order at the proper time, and at prices which were favorable, to acquire raw material for the manufacturing period. After the Russo-Japanese War, however, the majority did not possess such funds. Flour millers, for instance, appealed to the government for loans to carry them over the period of preparation for the season. Efforts were make to make credit available for North Manchuria. This lack of credit may be considered an old disease of the manufacturing and commercial life in the C. E. R. Zone.

This direct reason, as well as the generally unfavorable situation, made it impossible for individual manufacturers in many instances to retain the enterprise in their own hands. The short history of North Manchurian manufacturing industries therefore, records many cases of enterprises passing from hand to hand. With a few exceptions, not one of them is at present owned by the original founder. Many have changed hands several times.



Hongkong and Shanghai Bank, Harbin

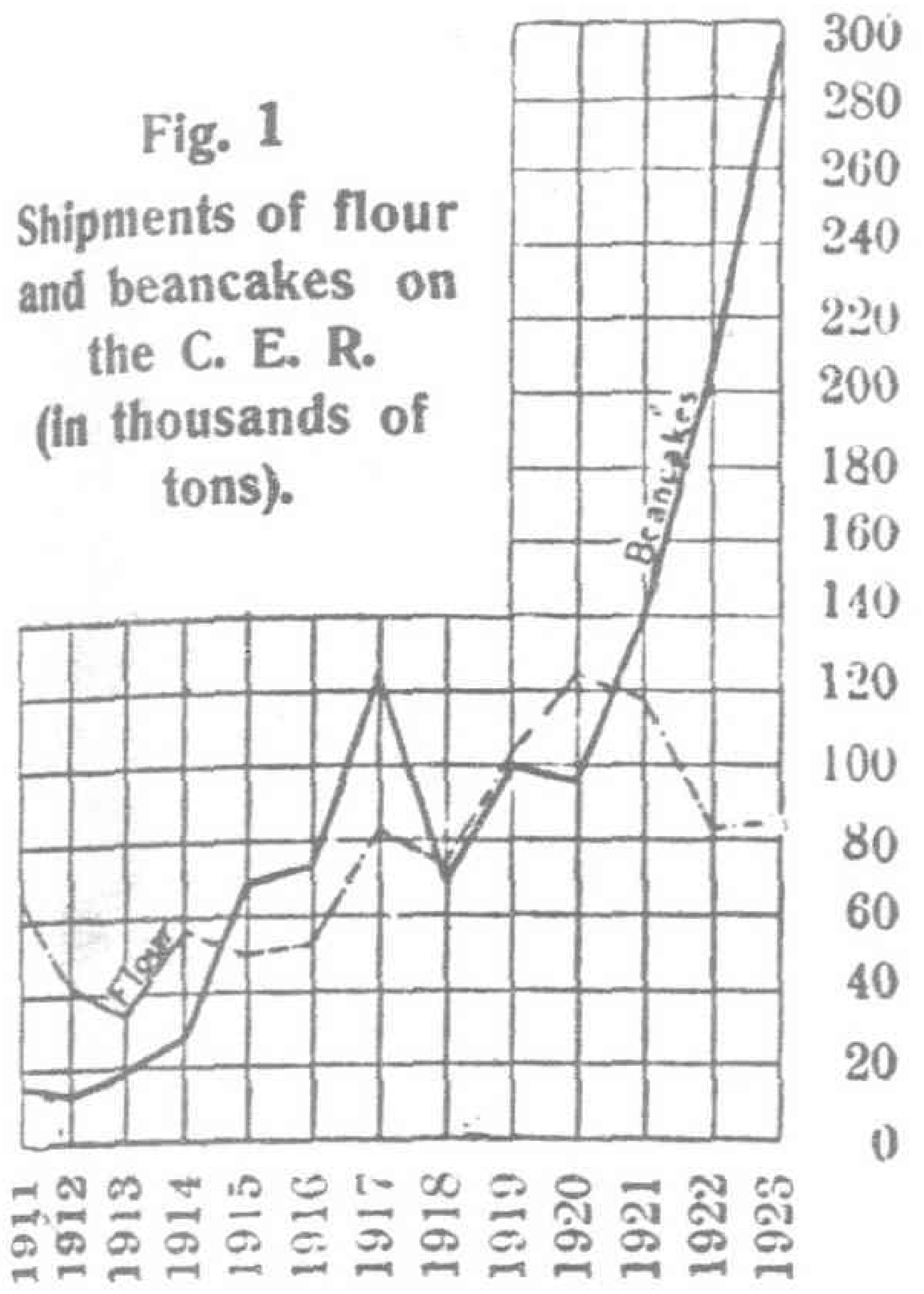


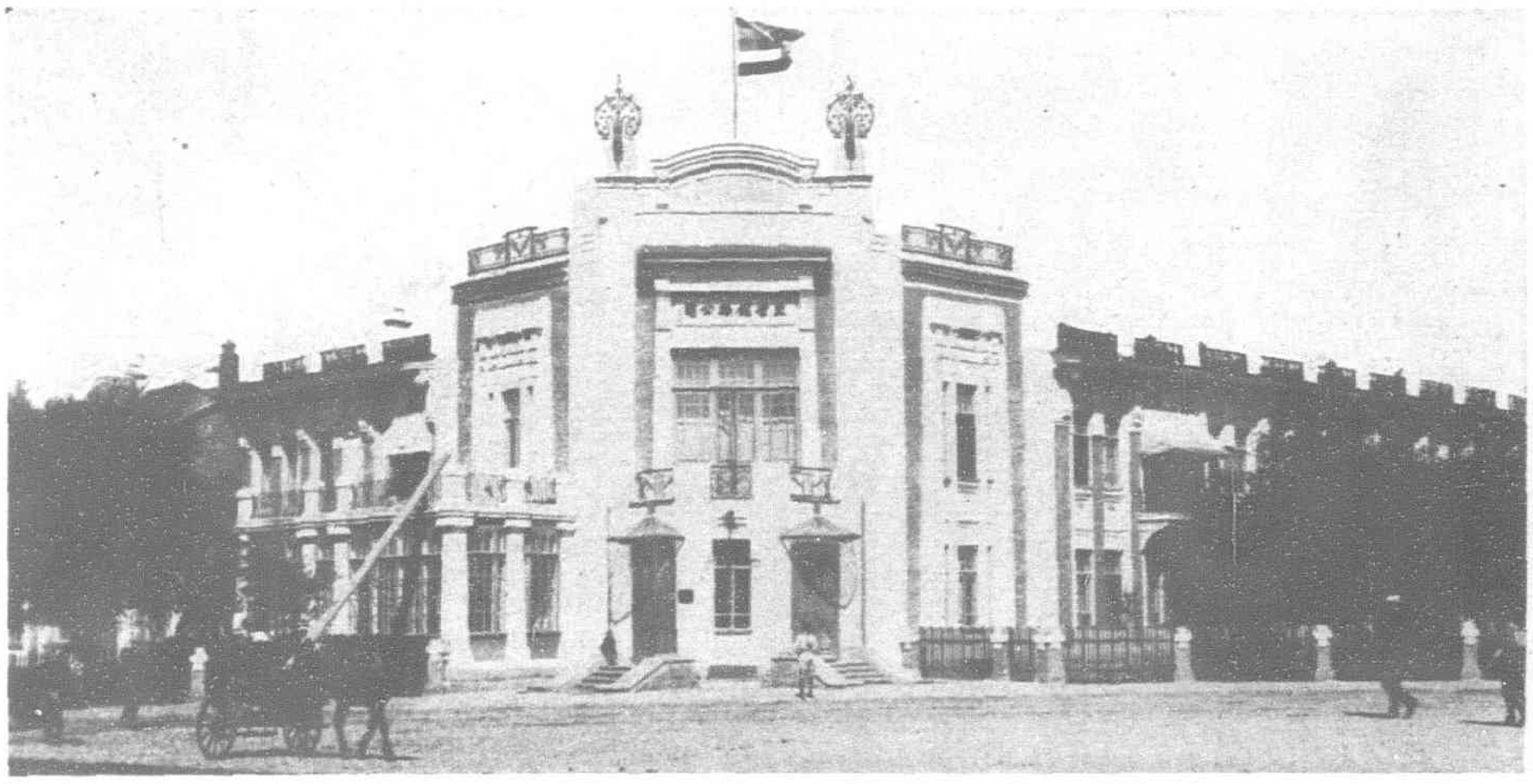
Fig. 1
Shipments of flour and beancakes on the C. E. R. (in thousands of tons).

Generally speaking, the sale of a manufacturing enterprise was as a rule accompanied by an imprevement in its financial condition because of the capital invested in the same by the new owner. This, however, could not radically change conditions under which industry labored, and the new owner often went through the experience of his predecessor, ending, as he had done, with a sale of the enterprise.

A more effective means was the combination of several similar enterprises into one, which was achieved either through the purchase by one person or through consolidation.

During the last three decades there have been many cases of such consolidation. Some of these have proved sufficiently solid, and are in existence even at the present time, while others were ephemeral and disappeared without leaving a trace. Others still are being established at present, and the future will show what their fate will be and the influence they will have on their respective branches of industry.

Among cases of transfer of manufacturing enterpriess from one owner to another, those are particularly interesting which record the acquisition of an industry by a dealer in or exporter of the corresponding product. The contrary interests represented by trade in raw materials and the export thereof thus become one with those of the manufacturer; otherwise these interests would have been forced to find a peaceful solution outside the firm. The resulting natural endeavor has been to exchange the exporta-tion of raw materials for export of the finished product.



Head Quarter of Chinese Eastern Railway Guard, Harbin

The export of finished products may be regarded as the third phase in the development of Manchurian manufacturing industries. This phase appears to us to be the natural end for the development of the entire economy of North Manchuria as a whole.

It should here be remarked that the division into three phases established by us refers only to the interior organic process of industrial evolution in North Manchuria. Like every other scheme, it differs by its apparent simplicity to a certain degree from actual conditions. The history of the growth of the various branches of manufacturing industries, as a matter of fact, presents rather a complicated picture, rich in important changes and deviations from the main road, which will be noticed when each of them is treated separately.

It would appear that if the export of finished products of North Manchurian industry were placed on a permanent and solid footing this would mean that it had reached its highest degree of development, where it was on a level with industries in other parts of the world. Rather it would only be necessary for this industry not to lag behind in technical progress and to improve the economic organization of the industry, while it at the same time would have the advantage of an abundance of labor, the lack of which is the greatest handicap to European and American industries.

North Manchurian manufacturing industries, however, have not attained this high level, and it is doubtful whether this will be reached in the near future.

Manchuria in general and North Manchuria in particular, is predestined to play a subordinate role with relation to the world market, as a more or less important base of supplies. Manchuria is primarily an agricultural country, and for this reason fitted for its role of a granary.

The manufacturing industries of North Manchuria are of dual importance to the world market. First, they supply local requirements, thereby impeding the importation of manufactured articles from abroad. Secondly, Manchurian manufactured articles in the world market have up to the present time been an improved method of transporting the finished product rather than the raw material, and they have by no means constituted any successful competitor to world industries. It is worthy of note that up to the present time flour mills and bean oil mills, the most important industries in North Manchuria, are enjoying in their export transactions the benefit of lower freight rates on the C. E. R., than those granted to exporters of wheat and beans.

The exportation to Europe of bean oil or flour, for instance, may be looked upon as a less expensive means of transporting beans or wheat.

The World War

The world war proved this trait of Manchurian industrial export with particular clearness. Even as in Russia, where an unusual demand for manufactured articles during the war required manufacturers to remove from their warehouses, where useless junk was kept, machinery which had already outlived its time and once more put the same to work on an equal footing with equipment of modern pattern, so the war forced countries to step out into the industrial arena which under normal conditions, because of the standard of their technical development, could not even have thought thereof. The deciding factor was not the perfection of the product, but conditions of transportation. For this reason Japanese piece goods conquered the entire Asiatic market; they reached as far as the Ural, and, as military goods, to the very city of Lodz. For the same reasons there was created an export of bean oil from Manchuria to Europe and America, Manchurian flour was sold in the market places of Irkutsk, and so forth. The world war brought back to Manchurian manufacturing industries a revival of the glorious period of the Russio-Japanese War, with the only difference that the same was played on a broader field and ended with complete ruin for individual manufacturers.

It is a well known fact that one of the principal reasons for the local industrial catastrophe was the rapid depreciation of Russian banknotes, as a result of which manufacturers, similarly to other holders of Russian paper currency, found themselves without funds. It is natural that the collapse of the Russian currency was a particularly hard blow to enterprisers of Russian nationality. Many of them were forced to sell their manufactories to their more fortunate foreign competitors. The depreciation of the rouble

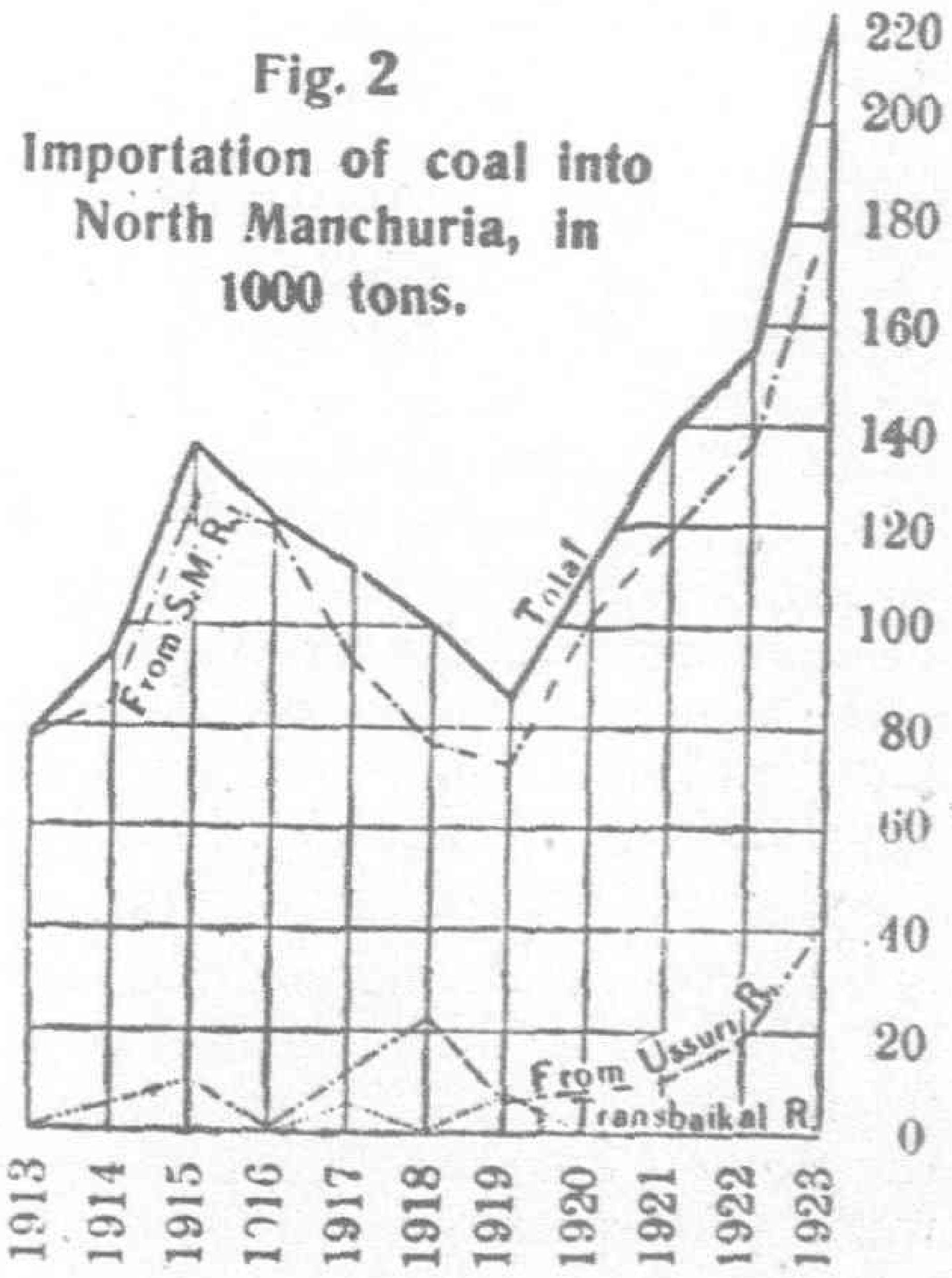
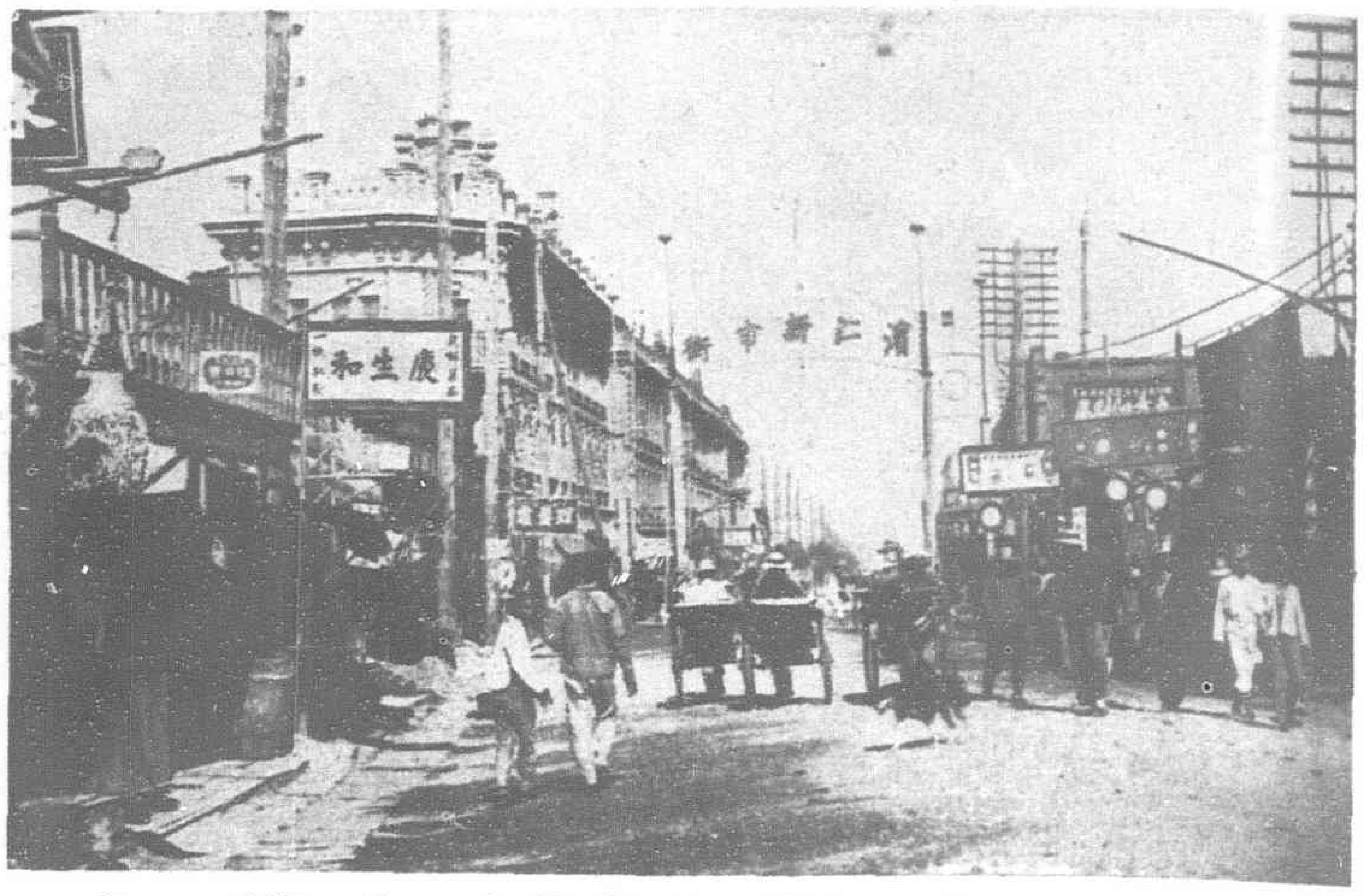


Fig. 2
Importation of coal into North Manchuria, in 1000 tons.

General Office of Chinese Eastern Railway, Harbin



Scene of New Street in Fuchiatien (Chinese Quarter of Harbin)

resulted in the fall of Russian industry from its recent dominating position in North Manchuria. At the present time Japanese or Chinese undertakings are equal, and even larger, in number. These latter, who work on a Mexican dollar basis, in their turn suffered serious losses through the fall in the silver exchange.

The entire manufacturing industry in the country became aware, with the end of the great war, that the basis upon which future successes of the export of finished products from North Manchuria was built, was not sufficiently solid. With the return of normal conditions of transportation and the gradual return to pre-war prices, North Manchuria once more had the opportunity to realize that the potential productivity of its manufactories was considerably in excess of the consumptive capacity of markets available to the same.

The last three years may be characterized as a period of acute crisis for the manufacturing industry in the Railway Zone, a crisis which is not as yet entirely past. This crisis indicates that the cycle of industrial development in North Manchuria is far from completed. On the one hand, the principal existing industries (flour milling, bean oil milling and distilleries) have not as yet found a proper means of exporting their products, and suffer from over production. On the other hand, the manufacturing industry has not as yet come to include all of the raw materials available in the country, and the latter are exported from Manchuria in order later to return in the form of finished products (cloth made from Mongolian wool, matches from local aspen, etc.). In the meantime Tientsin and, particularly, Shanghai, have proved the possibility of satisfactory working even with imported raw materials.

It may be expected that new branches of manufacturing will be created when, with the passing of the present crisis, there will be a return to intensive manufacturing activity, when an accumulation of capital has become possible, when there is available a supply of trained industrial workers, when connection has been established by manufacturers with foreign markets, and when a closer acquaintance has been gained with products made abroad.

In this connection the establishment of large industrial centres is of extreme importance.

Manufacturing Centres

A manufacturing enterprise creates others in close proximity, partly of the same kind, partly dependent upon or assisting the former. Near flour mills, for instance, there appear foundries, mechanical workshops, bag factories, and others. The growing center, with its increasing population, at the same time begins itself to play the role of an important market for fundameantal articles of manufacture, and serves as a motive for the establishment of new manufactories, small at first, rather in the form of workshops, but later growing into larger enterprises, in both cases conforming with local demand.

In the C. E. R. Zone, Harbin, with the adjoining Fuchiatien and suburbs, is the largest and most important centre of this kind. All of the large firms engaged in the export of North Manchurian products make their headquarters here. Harbin also includes the greatest number of flour mills, bean oil mills, distilleries, mineral water plants, soap factories, etc.

Compared with Harbin, all other points in the C. E. R. Zone, are, industrially speaking almost negligible.

Kwanchengtze may be considered among the larger of these, if Changchun be included in this point. In fact, however, Kwanchengtze-Changchun is less the terminal station of the C. E. R. than the beginning of the South Manchuria Railway.

Among industrial centres actually within the zone of the C. E. R., besides Harbin, station Anta attracts the greatest attention. Within recent years, in spite of unfavorable freight rates, there have been constructed at this station two flour mills, and six bean oil mills, while other similar enterprises are planned.

Industrial points which recently have come into existence, are, among others, station Mankow with two bean oil mills, Mutanchiang and Makiaoho, where, in addition to bean oil mills already operating, it is planned to construct flour mills.

Other points, such as Fularki (Fuliaerhti), Ashiho, Imienpo, Harbin, and Shwangchengpu, are older . These already have an industrial history, with periods of prosperity and of decline. Flour mills operated here as early as in 1903-1904. Here are also bean oil mills, distilleries, and mineral water plants (Fularki), beet sugar and refined sugar factories (Ashiho) and a brewery (Imienpo).

A general characteristic of the above points is that they are all engaged in the preparation of farm products : beans, wheat, barley, kaoliang, corn, beetroots, etc.

An unimportant exception is the glass factory at station Imienppo.

The most western points of the C. E. R., such as Manchouli and Hailar, are centres for the preparation of animal products: lard, hides and wool.

At Manchouli station there are two soap factories, and a tannery was opened in 1920.

At Hailar, in addition to soap factories, there are tallow melting and casing plants. There is under construction a comparatively large tannery, together with a sheepskin coat and feltboot factory. At Hailar also, as the centre of the wool trade in the C. E. R. Zone, there operate periodically seven wool washing plants.

Station Suifenho (Pogranichnaia), the most easterly point on the C. E. R., does not shine by its industrial development. Besides a small flour mill, industry is here represented by a brewery, a mineral water plant and two kwass breweries.

Compared with the insignificant industries along the line of the C. E. R., the Harbin centre appears enormous. With the only exception of wool washing plants, there are representatives in Harbin of all branches of industry existing along the line, and Harbin also overshadows the industry along the line with repect to the number of enterprises and their output.

For illustrative purposes we give below data concerning the more important industries.

There exist at present :

	In Harbin.		Along the line.		Total.	
Flour mills	26	68%	12	32%	38	100%
Bean Oil mills	45	75%	15	25%	60	100%
Distilleries	6	75%	2	25%	8	100%

The importance of the different points with regard to the flour milling industry and figures below relative to shipments of flour on the railway during the period from 1911 to 1923 (in tons) are interesting :

	Fularki	Tsitsihar	Anta	Harbin Junction	Ashiho	Imienpo	Hailin	Mutran-chiang	Shwang-chengpu	Other Stations	Total
1911 ..	15,350	—	—	36,500	0,710	0,400	5,600	0,940	4,870	1,100	65,470
1912 ..	0,770	—	—	33,310	0,480	0,050	5,130	0,890	0,400	1,260	42,290
1913 ..	10,660	—	—	18,980	0,270	0,050	4,560	0,160	0,100	1,310	36,090
1914 ..	21,060	—	—	30,060	0,530	0,180	3,650	0,450	0,050	1,240	57,220
1915 ..	11,450	—	—	33,110	0,030	0,320	2,890	0,920	—	1,290	50,010
Average per year	11,860	—	—	30,390	0,400	0,200	4,370	0,670	1,080	1,240	50,210
1916 ..	0,520	0,050	0,020	41,730	1,520	2,240	2,680	0,680	1,920	0,790	52,150
1917 ..	1,240	0,500	0,050	61,260	1,450	2,050	5,290	2,290	6,630	0,870	81,630
1918 ..	1,270	0,550	0,050	50,920	1,560	0,550	6,550	3,890	7,680	1,150	74,170
1919 ..	0,740	0,550	2,730	80,340	1,710	0,050	6,000	3,410	5,560	2,060	103 150
1920 ..	1,020	0,890	2,320	100,890	2,210	0,450	5,850	2,420	7,240	2,370	125,660
Average per year	0,960	0,510	1,030	67,030	1,690	1,070	5,270	2,540	5,800	1,450	87,350
1921 ..	0,420	0,580	0,520	101,240	0,790	0,160	6,060	1,080	4,970	2,240	118,060
1922 ..	0,750	1,300	0,710	69,920	0,170	0,370	4,240	0,650	3,400	0,780	82,290
1923 ..	0,600	2,150	0,240	71,810	0,020	0,620	3,470	1,500	3,380	1,280	85,070

Beside Harbin, Hailin shows more or less important shipments. The adjoining station, Mutanchiang, shipped flour emanating from the city of Ninguta, which comes within the sphere of influence of this station and which includes up to five Chinese mills.

The general growth of the industry during the different years beginning with 1911, is indicated in Fig. 1 showing the shipments of flour and beancakes during a number of years.

This diagram together with the below data relative to shipments of beancakes on the C. E. R., serve to illustrate the situation of the bean oil industry along the line of the Railway :

Tons

	Tsitsihar	Anta	Mankow	Harbin Junction	Ashiho	Imienpo	Hailin	Mutan-chiang	Other Stations	Total
1911	—	—	—	1,320	7,710	0,160	0,730	2,150	3,810	15 880
1912	—	—	—	3,610	5,810	0,100	0,480	1,500	1,730	13,230
1913	—	—	—	9,100	4,230	0,100	0,730	1,420	2,770	18,350
1914	—	—	—	15,370	5,500	0,110	0,450	1,370	3,890	26,690
1915	—	—	—	51,030	6,610	0,270	2,620	4,290	4,080	68,900
Average per year ..	—	—	—	16,080	5,970	0,150	1,000	2,150	3,260	28,610
1916	—	—	1,180	59,240	7,230	0,240	1,740	2,470	0,900	73,000
1917	0,050	0,030	0,770	111,450	7,060	0,520	1,260	1,870	1,230	124,240
1918	—	—	2,450	66,230	1,760	0,650	0,760	1,770	0,390	74,010
1919	—	0,110	2,060	82,920	2,480	1,180	4,270	5,770	0,730	99,520
1920	0,210	1,000	2,400	81,240	0,840	0,790	2,370	5,600	3,230	96,710
Average per year ..	0,060	0,230	1,770	80,210	3,870	0,680	2,080	3,500	1,100	93,500
1921	0,920	9,600	2,630	115,270	1,470	2,210	0,950	5,600	1,210	139,850
1922	0,490	13,790	0,740	180,890	5,250	1,160	0,390	3,480	1,500	207,580
1923	3,490	17,690	1,080	49,470	6,140	1,880	0,680	4,550	12,570	297,560

Shipments of beancakes from Harbin, similarly to shipments of flour, consequently represent more than 80 per cent. of the aggregate shipments of these products.

There is no necessity for discussing the reasons for Harbin's industrial growth. The central situation of the city at the intersection of railroads, and the availability of water routes (the Sungari River) to enormous farming districts which harvest many millions of tons of beans and wheat, and the large population creating local demand, are sufficient causes therefor.

The reasons for the poor development of industries along the line of the Railway, on the other hand, present a greater interest. Enterprises there, no less than at Harbin, are at the very point of supply of the corresponding raw material (grain), which is the principal reason for their having been located there. What then is the reason for the unfavorable situation of industry along the line, and what is the obstacle to its growth ?

The answer is to be found, first of all, in the conditions accompanying the disposal of the products.

Beancakes are almost exclusively an article of export. During the years of the war, when the bean oil industry really grew up, the export along the C. E. R. moved in a southerly direction. Harbin, thus, found itself closer to markets than did the western and eastern sections of the Railway, and it was found more profitable to erect factories at Harbin than along the line.

The principal market for flour, again, is South Manchuria, and also in this case Harbin has the advantage of cheaper delivery.

Harbin itself is the principal market for other articles of manufacture.

Another question of very definite importance when the matter of the locality for manufacturies along the line is considered is that of fuel.

Fuel Supply

The question of fuel supply is a very difficult one for manufacturing industries in North Manchuria.

In spite of the abundance of forests in the country, and in spite of the existence of coal fuel mines and still untouched deposits, North Manchurian manufactories work largely not on local fuel but on fuel imported from South Manchuria, namely Fushun coal. The industrial enterprises at Shwangchengpu, Harbin, Ashiho and Anta are tireless vassals of Fushun, and they represent nine-tenths of all North Manchurian industries. The balance principally burn wood and, in less degree, in the west, Chalainor and imported Transbaikal coal, and in the east, Ussuri and Suchan coal.

The below table gives an idea of the quantity of coal consumed by private enterprises at the Harbin junction (in tons) :

Coal Received at Harbin Station (in tons)

In 1906 ...	2,100	In 191 ..	49,790	In 1916 ..	103,660
,, 1907 ..	0,760	,, 1912 ..	67,180	,, 9 7 ..	118,180
,, 1908 ..	6,920	,, 1913 ..	64,440	,, 1918 ..	100,970
,, 1909 ..	14,270	,, 1914 ..	76,160	,, 1919 ..	87,520
,, 1910 ..	31,240	,, 1915 ..	115,220	,, 1920 ..	91,350
Average per year ...	11,060		74,560		100,340
In 1921 ...	117,060	,, 1922 ...	138,210	,, 1923 ...	168,580

In order to judge of the importance of these figures they are compared below with the total cartages of coal on the C. E. R. according to the commercial tariff :

Average per year during 5-year period.	Total carried Tons	Of this there was received at Harbin Tons	% of total
1906—1910	14,060	11,060	79%
1911—1915	110,060	74,560	68%
1916—1920	135,020	100,340	74%
In 1921	147,320	117,060	79%
,, 1922	190,590	138,210	72%
,, 1923	264,750	168,580	68%

Finally, the origin of the coal is seen from the below data which give the import into North Manchuria of coal for the private market as carried on the C. E. R. in tons (Fig. 2) :

	Total imported	From the Ussuri Rway	From the Trans-baikal Rway	From the South Manchuria Rway	
1913	78,760	0,190	0,180	78,390	99,5%
1914	91.200	5,130	0,180	85,890	90,4%
1915	136,846	10,110	0,770	125,966	92%
1916	120,726	1,400	—	119,326	99%
1917	113,459	11,310	5,400	96,749	85%
1918	100,990	23,190	0,190	77,610	77%
1919	87,860	5,810	7,080	74,970	85%
1920	111,375	8,710	0,020	102,645	92%
1921	129,470	10,020	—	119,450	92%
1922	157,930	18,040	—	139,890	89%
1923	225,144	40,190	—	184,954	82%

Fushun coal, imported via the South Manchuria Railway, on an average during the period from 1913 to 1923 represented 71 per cent. of the total quantity of coal carried on the C. E. R. and 96 per cent. of the consumption of Harbin.

Before the war Fushun coal was sold at Harbin at the rate of from $4.30 to $4.05 per ton. Judging from quotations on the Harbin Exchange, however, the price of coal by 1920 had reached the unbelievable figure of $30 per ton.

Beginning with the month of January, 1920 the price gradually dropped until it finally became firm, and remained at that level for two years, at about $10 per ton, which nevertheless is more than double the prewar price.

Prices of Fushun coal (2nd grade) at Harbin according to quotations of the Harbin Exchange (in Dollars per ton) :

Average during	1920	1921	1922
January—March	26.04	12.40	11.47
April—June	20.15	11.47	10.89
July—September	15.19	9.22	10.40
October—December	14.88	9.92	10.40

It is, therefore, not surprising that Harbin mills and other manufactories, burn, beside refuse of their own production, bran or beancakes under their boilers depending upon the price of the one or the other.

Since the second-half of 1921 Harbin has in increasing measure turned to Suchan coal. This coal, the better grades of which have heating properties which exceed the Fushun coal by from 16 to 18 per cent. might, if imported in sufficient quantities, cause serious competition to Fushun and deprive the latter of its monopolizing domination. However, the general unsatisfactory condition of industries of every kind in the Maritime Province of Siberia has up to the present time acted as a deterrent to the development of such import.

Insofar as local industries in the C. E. R. zone disposing of their products on the local market are safeguarded, by high railway freight rates, against articles from abroad, the cost of fuel remains immaterial to local manufacturers. This is a matter of greater interest to the consumer of the manufactured articles, who is compelled to cover the superfluous cost of production from his own pocket.

In the case of export, on the other hand, the low cost of fuel becomes one of the essential conditions of success. In any event, the bean oil and flour milling industries suffer from the competition of these industries in South Manchuria very largely because of the fact that the latter have the advantage of cheaper fuel.

In reverting to the distribution of industries along the line of the railway, it should be noted that the cost of fuel is highest at the largest grain centres. Anta, for instance, which ships from one-quarter to one-third of the total quantity of wheat transported on the C. E. R., and one-seventh to one-eighth of the total quantity of beans, receives its coal from Fushun, and pays for the transportation thereof about 90 gold cents per ton more than does Harbin.

There is, however, a still greater difficulty which confronts the manufacturer along the railway line—and that is the supply of labor.

Labor

The enterprises operating along the railway line are in a worse position than those at Harbin also as regards the labor question. The above mentioned Anta enterprises, for instance, are at times obliged to contract for labor in the south of Manchuria, and to assume the cost of transporting such laborers from Yingkow and Dairen and back, which is very burdensome in view of the nonpermanent character of the work. Harbin, on the contrary, has an abundant supply of coal labor, and the manufacturer here is subject to no long lasting obligations.

The principal contingent of laborers, naturally, is composed of Chinese. In enterprises belonging to Chinese they also occupy the places of employees, and it is only as an exception, particularly when a new enterprise is organized or for the sake of interior relations, that Russians are engaged. In enterprises of mixed ownership and those of purely Russian ownership, the majority of employees holding responsible position are Russians.

At the introduction of the manufacturing era the question of a supply of skilled labor was rather acute. Such workmen demanded high wages and were rare.

Now, because of the adaptability of the Chinese to new forms of labor and, partly, because of the Russian refugees, the situation has changed, and there is a plentiful supply of workmen and employees of every specialty in the market.

In the different industries and professions, and even in separate manufactories of similar nature, the wage scale is on an unequal basis.

As an example of the difference in wages paid at the flour mills in the C. E. R. zone we give the following figures covering regions where labor is paid comparatively well and where it is comparatively poorly paid (wages per month):—

	High	Low		High	Low
Miller...	$150	$62.5	Roller	$ 15	$ 8.5
Machinist	150	30.0	Oiler	15	8.5
Machinist's helper ...	75	17.5	Stoker	15	8.5
Thresher	20	17.5	Metal worker's helper	7.5	5.0
Packer	20	8.5			

It is possible, nevertheless, to establish a certain average of pay for unskilled labor. In Harbin this ranges from 4 to 8 dollars per month, including board and lodging, while it averages as high as from 10 to 15 dollars per month without board or lodging.

With the exception of certain Russian enterprises, the employer assumes no additional expenditures, such as medical assistance, insurance, etc.

The relation between workmen and employers may be characterized as one of absolute non-interference. With the exception of certain measures taken by the City Council relative to public sanitation, the situation of the workmen is regulated by no rules or standards. Besides, under the conditions surrounding the present legal status of the C. E. R. zone, the introduction of labor laws of any kind whatsoever would meet with invincible difficulties.

The curious trait of Chinese organizations whereby employees share in the profits, in a measure counteracts the lack of regulations and makes the interest of the employer also the personal interest of the employee.

Generally speaking, manufacturing enterprises are operated continuously, according to the Chinese calendar cycle, without closing down even for Sundays. If stoppages for repairs, cleaning of boilers, and holidays are deducted, the working year contains approximately 300 working days. (In Chinese enterprises up to 350 days, if account is not taken of stoppages due to purely technical reasons.)

The work is performed by double shifts of laborers relieving each other every eight hours. The working day of the individual laborer thus includes 8 hours one day and 16 hours the next. In general it consists of 12 full working hours.

Actually, however, manufactories have within recent times been operated with frequent interruptions and often closed down entirely due to the unsatisfactory general situation. The manufacturer is nevertheless subject to the payment of certain overhead charges even during the time his plant is closed down, inasmuch as he is forced to carry part of his staff on his payroll, while the workman, on the other hand, is never sure of permanent employment.

Inasmuch as we have dealt with the legal status of the workmen, which, from a European point of view is quite abnormal but yet natural because of conditions existing in China, it is not possible to pass by in silence the question of the legal status of the industries themselves.

The Legal Status

The basic and most characteristic peculiarity of the present state of affairs is instability and the resulting uncertainty as to the future and lack of faith in the same. The railway zone reflects all of the complicated international relations. The situation here is affected in the same measure by an edict from Peking and by resolutions of the Washington Conference. The very land upon which flour millers and manufacturers have erected capital buildings is not permanent property, but is registered in the name of owners with the proviso that it may be leased to other persons should circumstances so require.

Another, no less harmful characteristic of local conditions for the development of industry, is the unequal right enjoyed by the different nationals. While the Japanese and other foreigners are subject to the laws of their respective governments, Chinese, and now also Russian manufacturers, are subject to local laws. Definite civil procedure is the fundamental condition of all industrial activity. Without this there can only be a question of speculation. Inequality with regard to the legal status of manufacturers has a direct effect upon the cost of production, and for this reason it places the different industries upon unequitable bases of competition. While Russian enterprises within the limits of Harbin pay taxes to the city, the Chinese, in addition, pay taxes also to the Chinese Government, but, non-Russian foreigners refuse to pay any taxes whatsoever, with the exception of Customs duties.

The manufacturing industry has nevertheless succeeded in becoming an important factor in the economy of North Manchuria. The value of the aggregate annual output of manufactories of European type amounts to 25 million dollars. They throw yearly upon the home market and for export hundreds of tons of flour, beancakes, oil and other products, which, next to cereals, are the most important classes of freight carried by the Chinese-Eastern Railway.

New Motorship for Deli-Straits-China Line

The Netherlands Royal Packet Company have ordered from The Netherland Shipbuilding Company a twin-screw cargo and passenger motorship, of about 4,650 gross tons and 8,050 tons displacement on a mean draft of 20-ft. to be propelled by Workspoor Diesel engines of about 4,660 i.h.p.; also a smaller ship, to be fitted with Schelde-Sulzer Diesel engines and to be built by the Schelde Royal Shipbuilding Company. The ships have been specially designed for the owners' Deli-Straits China service, and will be of 390-ft. length, 52-ft. beam, with 27-ft. 6-inches depth.

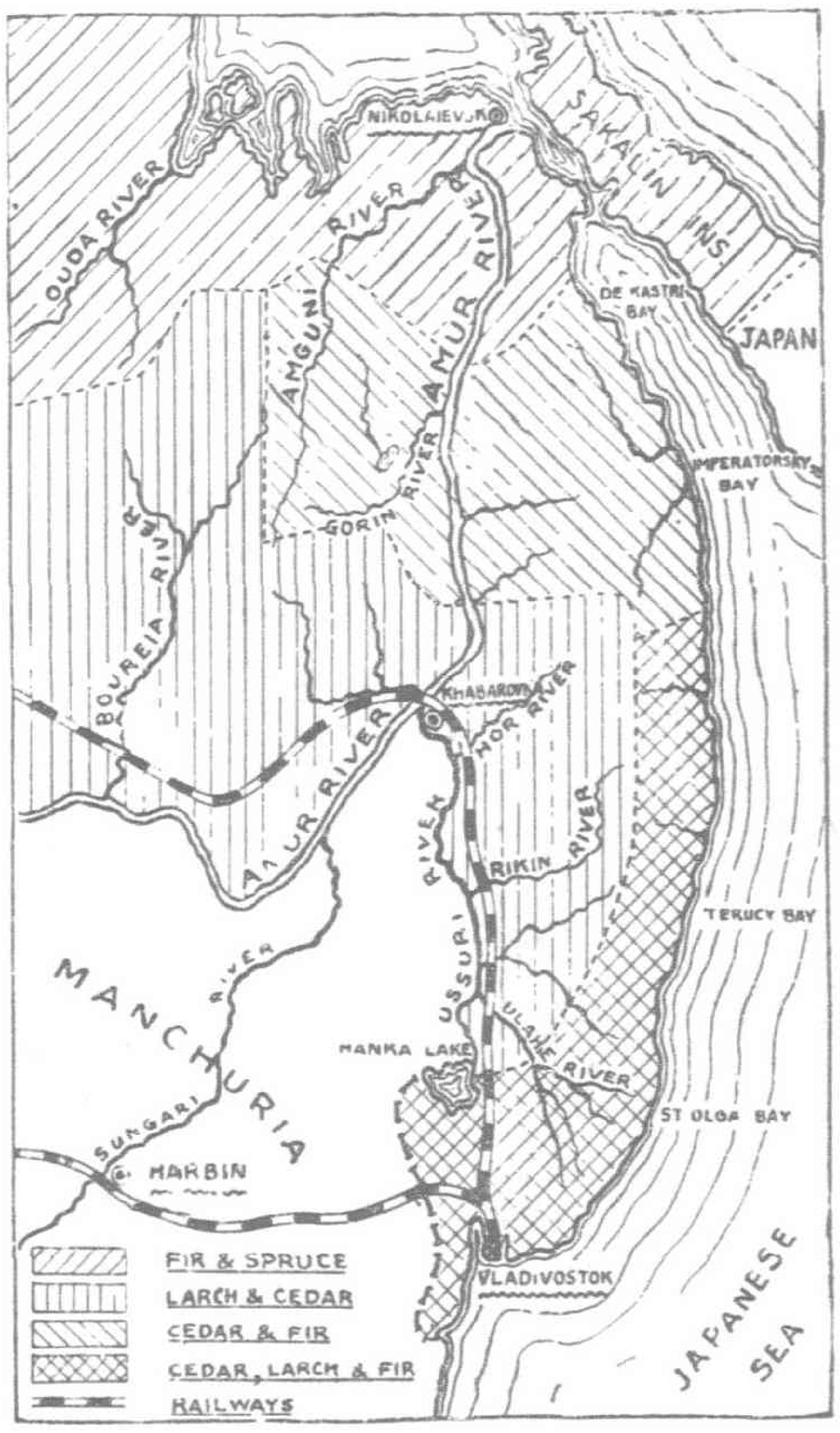
Forests of the Russian Far East

By Ivan Bushkoff

AMONG the numerous natural resources of the Russian Far East one of the most prominent places is held by the enormous reserves of extremely varied and valuable lumber. According to data supplied by the Russian Far Eastern Forestry Department the following are the areas covered with forests :—

Province :	Total Area	Area Suitable for Exploitation
	In Dessiatines *	
Maritime	40,904,000	26,467,500
Amur	34,841,000	11,792,500
Kamchatka ...	10,000,000	487,000
Saghalien ...	2,500,000	2,500,000
Total	88,295,000	41,247,000

These figures do not include the forests of the Transbaikal and the Yakutsk region and those along the whole coast of the Okhotsk and Behring seas of an area of about 200,000,000 dessiatines.



Aside from these forests there are those which before the revolution were assigned to the Cossacks and to emigrants from European Russia. They cover an area of about 10,000,000 dessiatines. The greater part of these forests are also suitable for exploitation. Little information is available with regard to them as well as about the free forests † in the Amur province.

It should be mentioned here that the former Russian Government as a rule allotted land to emigrants from European Russia along the valleys of rivers, narrow valleys and gulleys being condemned for purposes of settlement. So far emigrants have not penetrated into the northern districts of the Amur and Maritime provinces and the forests there are in their primitive state and in future will yield the bulk of exportable timber.

Until 1920 the selective method of cutting lumber was largely used in the Russian Far East, i.e. the lumberman would cut only such trees as he required, leaving the other trees to grow.

There are considerable areas covered with virgin forests in that country, it is only necessary to find adequate means of transportation and to exploit the resources judiciously.

The principal forests are situated in the basin of the river Amur and along the Sikhota Alin mountains.

The forests in the Russian Far East are mixed, abietic species predominating in some parts, while in other districts leafy species form the bulk of the trees. The principal trees of the abietic species are cedar, larch, fir, spruce and pine, and the leafy species are represented by oak, ash, linden, aspen, birch, walnut, maple and velvet-oak.

In view of the incomplete survey of the forests in the regions adjoining the Amur river these cannot be divided into definite forest zones, it is only possible to discuss the forests in the following principal areas :—

(1) The Lower Amur and its tributaries,
(2) The coast of the Russian Far East, and
(3) The South Usuri district.

The forests in the Lower Amur are situated between the 49° and 54° northern lattitude and the 133° and 144° eastern longitude. They are bordered from the north and the north-east by the Gulf of Tartary and the Okhotsk Sea, from the east by the Sikhota Alin mountains, from the South by the divides of the rivers Nemptu, Onnoy, Kura and Gorin, and by the Little Khingan and the Dusse Alin mountains from the west.

The principal species in the Okhotsk and Kamchatka provinces along the coast of the Russian Far East are fir, spruce, and larch, then comes birch, aspen, ash and oak, whereas in the Nikolaevsk and adjacent districts the dominant species are fir and spruce. The trees are from 150 to 200 years old and one dessiatine contains upward to 40 cubic sajene ‡ of timber.

Owing to a considerable density of the foliage in these forests the sun does not penetrate to the undergrowth of young fir and spruce and consequently it grows very slowly and the trees reach a diameter of 8 inches about 20-ft. from the ground only after, say, 150 years.

Spruce is somewhat inferior to fir. It often decays and healthy trees with a diameter of 10 to 12 inches about 4-ft. from the ground are rather scarce.

These forests cover about 75 per cent. of the whole area.

With the rise of the level of the ground the fir and spruce forests begin to change in their character. The effect of the winds begins to tell, the trees do not grow very tall and the tops are frequently bent.

Lower down in the marshy plants fir and spruce are replaced by larch and sometimes one finds large tracts of land covered with abietic species which, although growing slowly, are quite healthy. Mixed growths of fir, spruce and larch, the latter predominating, occupy the northern slopes of the low mountain ridges. There one finds almost exclusively larch with a sprinkling of fir and spruce. Larch grows rather slow and reaches the thickness of 8 inches about 24-ft. from the ground after 120 years.

The average quantity of timber on one dessiatine of larch is about 45 cub. sajene. The trees look very good, they are healthy and the trunks are clear of branches. the age varies from 150 to 200 years. In places where the soil consists of clay one finds growths of larch. The trees are from 250 to 300 years old and one dessiatine would yield about 30 cub. sajene of timber.

Some areas are covered exclusively with birch with fir and spruce here and there. The age varies between 100 and 140 years and one dessiatine would yield about 25 cub. sajene. Clean growths of aspen are also found covering vast areas. This tree would yield about 30 cub. sajene of timber per dessiatine. The age is between 100 and 150 years, the trunks are quite clear and are 10 to 14 inches thick about 4-ft. from the ground. Aspen which grows in the mountains is of inferior quality and not suitable for commercial purposes.

Oak is very scarce owing to adverse climatic conditions. It is to be found only in small quantities on the southern slopes of the mountains and one dessiatine does not yield more than 5 cub. sajene of timber.

This about completes the description of the forests in the Lower Amur. Further, beginning from the basin of the river Gorin, which passes through the northern boundary of the distribution of cedar, other species of trees are to be found.

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* One Dessiatine is equal to about 2. 7 acres.

† Forests which were controlled by the Department of Government Lands, but were available Free to any Russian requiring timber for his private use.

‡ In Russia a distinction is made between a cubic sajene of timber and a cubic sajene of firewood, the former being 220 cub. feet and the latter representing a stack of 343 cub. feet.

The river Gorin is one of the largest tributaries of the Lower Amur. Up to some 40 miles from its confluence with the Amur the river flows to the north-west, but at its confluence with the river Bakhtar she strikes a western course. The forests along the lower course of the Gorin are formed principally of cedar between 250 and 300 years old yielding about 45 cub. sajene of timber to the dessiatine. The cedar forests along the southern section of the basin of the river Gorin make a very favorable impression. Some trees are upward to 120-ft. tall and have a mean diameter of 20 inches 4-ft. from the ground. Cedar here grows on the southern slopes of the hills and is intermixed with fir and spruce.

Fir in the basin of the river Gorin is much better than in the Okhotsk-Kamchatka region. The trees are fuller and the trunks are clear from branches. A sprinkling of cedar is always to be found in these fir forests. The age of fir here is between 150 and 200 years and one dessiatine would yield about 45 cub. sajene of timber. Fir predominates over a vast area, although one finds cedar and spruce, the latter yielding much better timber than spruce of the Okhotsk-Kamchatka region. At higher altitudes and towards the Sikhota Alin mountains the proportion of spruce increases considerably.

Firewood Market, Harbin

Further down south the character of the forests changes and among cedar growths one finds ash, velvet-oak and birch.

Larch is to be found everywhere in growths of fir and spruce. Its age ranges from 200 to 250 years. In valleys one finds areas covered exclusively with larch 150 to 200 years old with an average yield of 30 cub. sajene to the dessiatine. The summits of mountains are covered with spruce, fir, cedar and larch 200 to 250 years old.

The banks of the larger rivers are covered with abietic species among which ash, elm and birch predominate. Now and again one finds there cedar, fir aspen and poplar. These forests could yield an average of 40 cub. sajene of timber to the dessiatine.

The forests along the Russian Far Eastern coast, extending from Imperatorski Bay to Vostok Bay and inland as far as the Sikhota Alin mountains, may be devided into three zones:

(1) The northern zone, extending from Imperatorski Bay to Ternei Bay, in which fir and larch predominate,
(2) The central zone, extending from Ternei Bay to Olga Bay, in which cedar and fir predominate, and
(3) The southern zone, from Olga Bay till Vostok Bay, in which abietic species predominate.

In the northern zone the Sikhota Alin mountains are further inland than in the south and the whole coastal zone is intersected by low ridges and broad valleys. The coast and the low hills are covered with spruce with a small proportion of fir. Further inland one finds fir and certain abietic species.

Fir is usually to be found on the slopes of mountains. The average age of the trees is from 150 to 175 years and one dessiatine could yield about 30 to 35 cub. sajene of timber.

Larch grows in the hills. There is always a certain proportion of fir and spruce growing there as well. The reserve of timber is about 35 to 40 cub. sajene per dessiatine. The forests of this zone remind one of the taiga in northern Siberia.

Further to the south the country is more intersected on account of the Sikhota Alin mountains running closer to the coast. Here fir and spruce forests extend further inland as far as the slopes of the Sikhota Alin mountains. Larch here covers only small patches nearer the water divide. The valleys are covered with mixed cedar and fir, but one also finds considerable areas on which cedar alone grows. The valleys of the rivers are covered with abietic species, ash and birch predominating. A narrow strip along the coast is quite barren. Further inland come thick growths of aspen and birch with here and there an oak and cedar. In the valleys of the mountains and on the slopes one finds growths of oak 150 to 200 years old. Along the middle courses of rivers, in valleys and depressions, one finds the best mixed growths of cedar. The average cedar here is about 100-ft. tall with a diameter of 15 to 20 inches 4-ft. from the ground. The average yield per dessiatine being upward to 40 cub. sajene of timber.

The southern slopes of the Sikhota Alin mountains are covered with cedar, which yields the best timber available on this coast. Cedar here is from 250 to 300 years old, the trees reach from 100 to 130-ft. in height and have a diameter of 15 to 20 inches at the height of the chest. One dessiatine of cedar here could yield about 40 cub. sajene of timber.

Nearer to the divide fir predominates, but there is also a certain quantity of cedar and spruce to be found. Such forests grow on the higher altitudes of the mountains. In this area vast stretches of land, formerly covered with abietic species, have been destroyed by forest fires.

The southern part of the coastal area, extending from Olga Bay to Vostok Bay is covered with leafy species, however, abietic species are also to be found here further inland and nearer to the mountains. Cedar, with an admixture of about 20 per cent. of fir, grows in patches here and there. The valley' of the rivers are covered with various abietic species with a predominance of ash and linden.

Further inland one finds excellent cedar forests with trees about 175 to 250 years old. The mountains are covered with spruce. Behind the mountains extend the steppes of the Usuri district.

The forests in the South Usuri district contain both abietic and leafy species. Cedar is the principal among the abietic species, then comes fir, spruce and finally larch. Among the leafy species one finds oak, maple, birch, linden, aspen, ash, walnut, poplar and velvet-oak.

The first place among the trees enumerated above, as regards their commercial value, undoubtedly belongs to cedar ; then comes spruce, aspen and ash in the order given. However, these trees are not evenly distributed in this district. Most of the trees are at least 150 years old and about 90 per cent. of the trees are suitable for constructional purposes and may be classed as mature lumber, the remaining 10 per cent. of immature trees falling mostly on leafy species. Considerable areas, which had been devastated by forest fires or an which the trees had been cut, are covered with young growths.

Growths of aspen often contain a certain proportion of cedar, ash, birch and poplar. They contain about 25 cub. sajene of timber to the dessiatine.

One does not find here new growths of cedar in view of the fact that after cedar is cut the ground is usually quickly covered with dense scrub. Some hills on which forest fires had destroyed all the trees are at present covered with birth, but this tree is also to be found in the valleys on the north-eastern slopes of the mountains. Birch here is about 100 to 120 years old and could yield upward to 40 cub. sajene of timber to the dessiatine. A certain proportion of cedar, aspen and ash is also to be found in these birch forests.

Cedar here grows on excellent soil with the result that the trees are very tall and the trunks rather thick and clear of branches to a consideralbe height. They are from 150 to 200 years old, 70 to 90-ft. tall with a diameter ranging from 14 to 20-inches. at the height of the chest. These cedar forests may be divided into three cathegories :

(1) Forests consisting of cedar only. These have an enormous reserve of excellent timber—at least 60 cub. sajene to the dessiatine—about 80 per cent. of which is suitable for cabinet making.

(2) Cedar forests from 130 to 170 years old with an admixture of fir about 100 to 150 years old. The reserve is upward to 50 cub. sajene of timber to the dessiatine.

(3) Cedar forests about 150 to 200 years old with an undergrowth of cedar from 50 to 80 years old. The reserve of timber is upwards of 40 cub. sajene to the dessiatine. The trunks are quite straight and almost every tree could yield two logs 21-ft. long, the first 13 to 15-inches in diameter and the second 9 to 11-inches in diameter at the upper end.

Next in value and quantity comes fir. It covers vast areas nearer the summits of hills and the northern slopes of the mountains. The age of the trees varies from 100 to 150 years and one dessiatine would yield upwards of 50 cub. sajene of cut timber.

Larch grows in large quantities in the valleys of the rivers Iman and Hor. Growths of larch sometimes contain a certain proportion of fir. The average age of larch here is from 100 to 130 years and the reserve of cut timber upward to 50 cub. sajene to the dessiatine. The trunks are quite straight and some trees are 100-ft. tall with a diameter of 25-in. at the height of the chest.

These districts are also rich in leafy species such as oak, ash, aspen, birch, linden, walnut, velvet-oak and maple.

The southern slopes of the hills are covered with oak forests containing a certain proportion of aspen and birch. The age of oak here varies from 120 to 150 years, the trees are from 60 to 70-ft. tall and one dessiatine would yield from 25 to 30 cub. sajene of cut timber.

Different kinds of leafy species, mostly hardwood, cover the wide valleys of the rivers, however, ash is the tree most frequently met with. Its age varies from 100 to 150 years, the trees are 100 to 120-ft. tall and the reserve of cut timber is up to 70 cub. sajene to the dessiatine.

The valleys of the Usuri river and of its tributaries are covered with aspen from 80 to 100 years old with a reserve of upward to 60 cub. sajene of cut timber to the dessiatine. White birch is also to be found here either growing in separate pacthes or intermixed with aspen. The average age is about 100 years and the reserve about 40 cub. sajene to the dessiatine.

However, cedar is undoubtedly the most valuable tree in this region. It is to be found almost throughout the Maritime province with the exception of the Nikolaevsk district in the north. Sometimes one finds specimens 400 years old and 150 -ft. tall, but in general the age of cedar here varies from 250 to 350 years and the trees are from 100 to 130-ft. tall. The diameter is between 15 to 20-inches at the height of the chest. Cedar yields excellent timber and the trees are such that very logs may be obtained. Boards cut from cedar have a pinkish tinge, are easily worked, take paint well, are easily polished up and do not crack. It is excellent timber not only for building purposes but for cabinet making as well. Furthermore this timber is not subject to attacks by insects which is a very important factor in tropic countries. Messrs. Skidelsky Bros., at one time the most prominent timber merchants in the Maritime province, made in 1917 several shipments of cedar to London with very satisfactory results

Larch is to be found throughout the Russian Far East, especially in the northern districts of the Maritime province and in the Amur province. The average age is about 150 years, the trees are between 70 and 100-ft. tall with an average diameter of 12 inches at the height of the chest. Larch is very resinous and hard and is excellent timber for submerged constructions, also for railway sleepers, telegraph poles and piles.

Next in importance after cedar comes fir, which holds promises of a great future. It grows faster than cedar, but is never as tall and as thick. Fir here grows mostly with cedar and spruce.

About 84 per cent. of the whole area described, *i.e.*, 5,000,000 dessiatines, is covered with forests of which 3,500,000 dessiatines are covered with abietic species. The Iman district is richest in abietic species, which cover 73 per cent. of its area. Next comes the Habarovsk district with 58 per cent., then the Nikolsk Usuri district with 47 per cent. and finally the Olginski district with 44 per cent. The most important among the abietic species are cedar, fir and larch. The best and the most valuable cedar grows in the Iman and Nikolsk Usuri districts.

In 1917 the Forestry Department, which controlled the whole of the 5,300,000 dessiatines of these forests, made arrangements to select and cut cedar, fir and larch. It was estimated that upward to 2,000,000, logs could be cut in one year, representing bout 65,000,000 cub. feet of timber. However, the revolution and the civil war made it impossible to carry out this plan. The same reasons were responsible for the shelving of the project of granting concessions, which had been decided upon in 1913.

In 1914 concessions were granted to cut timber over an area of 10,000,000 dessiatines on the coast of the Gulf of Tartary and also on the lower course of the river Amur. The concessionnaires were authorised to cut yearly the following quantity of loge of abietic species :—

Cedar	325,000	logs
Fir and Spruce	900,000	,,
Larch	500,000	,,
Total	1,725,000	,,

This quantity of logs is equal to roughly 40,000,000 cub. feet of timber.

In allowing the concessionnaires to cut this number of logs each year the Forestry Department had in view the preservation of the forests in the Russian Far East, although, strictly speaking, they could have easily made a much larger allowance in view of the fact that owing to favourable conditions the average yearly increase of timber per dessiatine is about 45 cub. feet. It is estimated that 360,000,000 cub. feet a year could be easily cut without in the least threatening the existance of these forests.

Aside from abietic species there are in the Lower Amur enormous reserves of valuable leafy species forming about 25 per cent. of the entire quantity of lumber.

The Provisional Amur Government was the first to take definite steps in 1920 towards grantong concessions. These concessions were in 15 separate lots and were set aside along the coast of the Guld of Tartary, extending from Cape Murashkin to Ternei Bay. The total area was 4,500,000 dessiatines, the allowance 30,000,000 cub. feet of timber a year and the price payable to the Government was fixed as follows :

Cedar	7 gold copeck per cub. foot
Larch	4½ ,, ,, ; ,, ,,
Fir and Spruce	4 ,, ,, ,, ,, ,,
Firewood	1.50 gold rubles per cub. sajene.

In 1920 and 1921 the Provisional Amur Government succeeded in placing nine of these 15 lots with a total area of 2,600,000 dessiatines and with an estimated output of 17,000,000 cub. feet of timber a year. These lots were taken up by large Japanese concerns requiring wood-pulp for their paper mills. They agreed to pay a price of an average of 50 per cent. higher than was originally mixed by the Government. However, the political events in 1921 and 1922 forced the Japanese to curtail their work and finally to abandon it altogether.

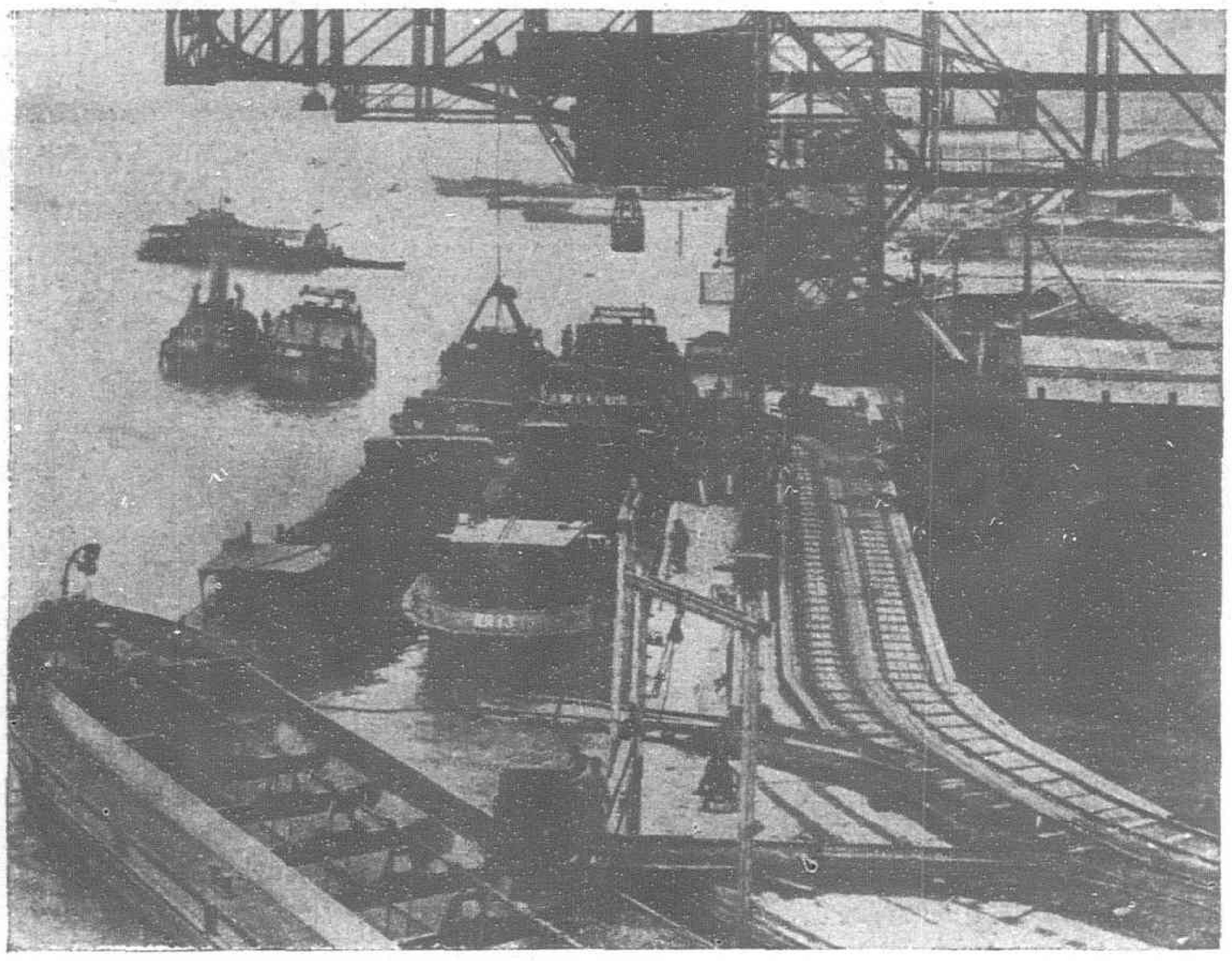
In spite of all the difficulties experienceed in the Maritime province during the recent years, the urgent demand from China and Japan for timber for paper mills and for match-wood as well as for railway sleepers and building materials forced these countries to enter into close commercial relations with the Maritime province. Others countries as well began to take an interest in Russian timber. Even before the war timber was being exported from the Maritime province to Australia, India, South Africa and Britain. Australia alone requires about 20,000,000 cub. feet of timber for cases and this quantity is bound to increase with the time.

The forests in the Russian Far East are especially favorably situated because of their proximity to the Pacific which serves as a connecting link with countries which are at present or at least are bound to become in the not too distant future, the biggest buyers or timber from the Russian Far East.

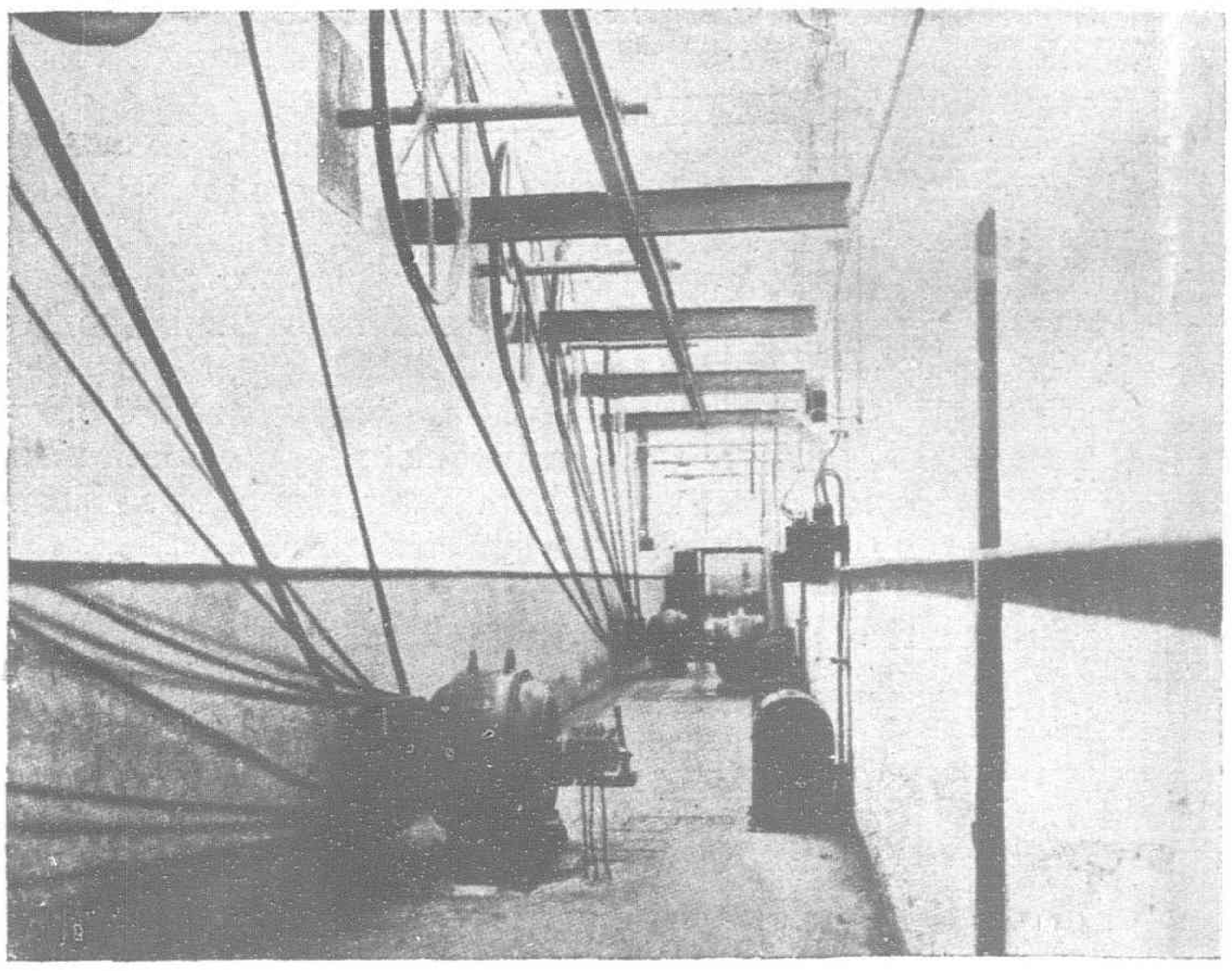
The forests in the Maritime and Saghalien provinces are more favorably situated than those on the Pacific coast of America, which are being rapidly exterminated. There is but little doubt that the time will come when the virgin forests of the Maritime province will play in important part on the world's timber market. Even before the war some of the biggest American lumber companies which are firmly established on the China market, began to realise that the time was not far away when they would have to turn to the vast reserves of lumber—some 100,000,000 dessiatines —of the Maritime, Amur, Saghalien and Kamchatka provinces.

The lower course of the Amur, about where Nikolaevsk is situated, is not accessible to sea-going craft. The river is very shallow and practically all cargo boats have to anchor in midstream and take their cargo from lighters, which makes loading

(Continued on page 224.)



Coaling Plant, Riverside Power Station



5-80 h.p. Motors Driving 1,000 in a Shanghai Cotton Mill Driven by Municipal Electricity Supply

Use of Electrical Machinery in China

G. C. Howard, Acting Trade Commissioner, Shanghai

PROBABLY 90 per cent. of the electric plants in China are used for lighting purposes, the only plants carrying power loads of any importance being located in treaty ports such as Shanghai, Tientsin, Hankow, Canton, and cities like Hongkong, Mukden, and others, where industrial development has made rapid strides and where the majority of China's large manufacturing plants are located.

In China it is estimated that there are approximately 285 electric light and power plants with a total generating capacity of about 400,000 kilowatts.

The growth of electric generating plants in China was slow up to 1916. The industry during 1914 gave promise of rapid growth but this was delayed because of uncertainties arising out of the war. From 1916 to 1921, however, it was very marked and rapid. An instance in point is that of the Mukden Electric Light Works, which started 14 years ago with a 350-kilowatt unit, had increased to only 850 kilowatts in 1920, but now has a capacity of 4,000 kilowatts.

Growth of Demand for Electrical Equipment

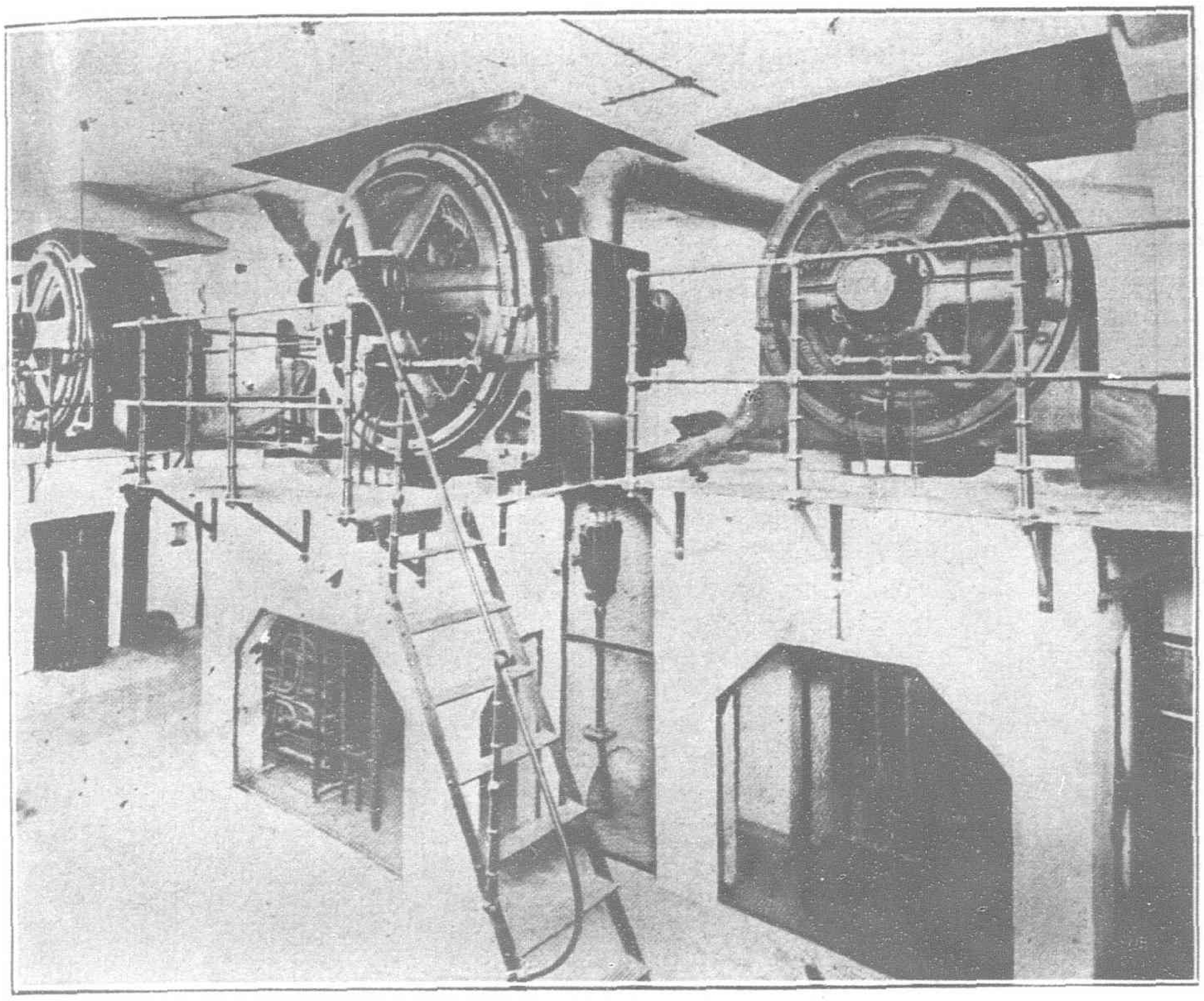
Prior to 1910 the electric light and power industry in China was in an embryo stage. Practically all the plants which were supplied were of European manufacture and few, if any, turbo generators had been considered for China. In 1910 an American company sold a 350-kilowatt turbo generator to the Mukden Electric Light Co., the first to be supplied to China. Later, in the same year, an order was secured for a similar machine of 500-kilowatt capacity for the Changshun Electric Light Co. At the time of placing these orders they were considered revolutionary, as practically all previous plants installed had been driven by reciprocating engines.

The greatest factor in the increase of electrical power plants has been the growing industrial enterprises in China, particularly for modern cotton spinning and weaving mills, flour mills, vegetable oil mills, and similar industrial plants. A very large part of the output of the Shanghai Municipal Council electrical undertaking is used by local manufacturing concerns. In other sections industrial enterprises have been responsible for the installation of power plants of their own, varying in capacity from 500 to 3,000 or 4,000 kilowatts.

A Shanghai Cotton Mill Showing 104-7½ h.p. Motors each Driving 400 Spindles, Aggregating 41,000 Spindles Driven by Municipal Electricity Supply

Cities Demand Electric Lights

Simultaneous with the demand for industrial machinery, and undoubtedly influenced by the electrical equipment installed in the spinning mills, there was a growth in the demand for electric lighting for cities, large and small, and while the manufacturing industries were confined to districts surrounding the large open



3-6000 volt Motors Aggregating 1,200 h.p. in a Shanghai Flour Mill Taking Municipal Electricity Supply

ports, lighting installations quickly spread over all parts of China from north to south. Electric lighting plants are now to be found in cities many days' journey from the nearest railways and waterways. In many cases these small plants have been sponsored by the local gentry, who, after having visited the outports, desire electric lights in their homes. As a result there are now very few cities or towns in China of any considerable population that are without electricity. A fair number of small units of from 2½ to 10 kilowatts are distributed in locations where central station power is not available.

Cheap Coal and High Power Rates Yield Profit

In most places in China cheap supplies of coal conveniently located are available. Much of the coal is of poor quality, but in spite of this, with anything approaching good management, these small lighting plants pay handsomely, as it is always possible to secure high rates for electric current. Even in locations where the cost of coal is high, many of the small plants are selling current to consumers on a flat rate basis ranging from $1 to $1.50 per 16 candle-power lamp per month.

Certain power plants in China are, however, unsatisfactory from a credit point of view. They are in many cases carrying heavy overloads without the opportunity of shutting down for periodic inspection and overhauling, and are, consequently, in rather poor condition.

In addition to turbo-generato units, a large number of generators, driven by steam and oil engines, ranging in size from a few kilowatts up to 300 kilowatts, are used. A few water turbines of small size are found, but this field is practically undeveloped.

German and Swiss Competition Pronounced

Beginning with 1921, European, particularly German and Swiss, competition began to show itself to a very appreciable degree, offering equipment which, although in many cases considered inferior to American manufacture, was acceptable to Chinese purchasers, particularly at the prices offered—50 to 75 per cent of the manufacturers' selling price of American makes. Swiss manufacturers have taken a very large number of contracts, and the equipment they have supplied appears to be first class in every respect. English manufacturers have supplied material which undoubtedly is first class and the criticism in regard to lower quality and efficiency is directed mostly against German equipment. European manufacturers, their agents and representatives, and particularly Germans, are very anxious to regain this class of business in China. This is evidenced by a large number of representatives now competing for power plant business here. This fact, coupled with the general falling off in demand, due in part to the fall in exchange, has made business for American electrical machinery show a very considerable decrease.

Imports of Generating Equipment Estimated at 50,000 Kilowatts

No definite import figures for the entire country are obtainable because the Chinese Maritime Customs statistics do not make a separate classification for the electric power plants and equipment. The statistics list complete cotton spinning plants, flour mills, and similar apparatus under their respective headings, including in the entry any electrical equipment which may form a part of the shipment. Estimates made from available individual port statistics and by importers place 1923 imports of electric generating equipment of all classes at a total of 50,000 kilowatts. In 1923, under the customs heading "Electrical Materials and Fittings," total gross imports were valued at 8,480,510 taels, of which the United States supplied 1,332,000 taels, Great Britain 1,244,510 taels, Germany 2,064,100 taels, and Japan 2,495,100 taels. (One tael in 1923 was worth $0.8231.)

Operating Practices Unsatisfactory

The upkeep of electric plants is most unsatisfactory from the point of view of efficiency and the manufacturers or their representatives in China encounter considerable difficulty in impressing upon their customers the necessity of making repairs when they become desirable, the tendency among the Chinese being to get along as best they can until they are compelled to make repairs in order to keep the plant in operation. The seller is then called upon to perform a rush job—often at far greater expense to the customers than would have been necessary had the repairs been made in time.

The majority of plants make no effort to secure an evenly distributed load, most of those in interior cities starting at dusk and running until daylight and closing down during daylight hours as no day load is available. Manufacturers are, however, endeavoring to show the operators the benefit of securing a 24-hour load. They have met with success in isolated cases, but the idea is very slow in spreading.

Market Prospects Favor Future Trade

While the continued widespread domestic uncertainty and low-priced European competition prevail, the prospects for any great increase in the sale of American electrical machinery in China can not be expected, but as soon as the unrest ends a considerable market should develop. There will, of course, even during the present period, be orders placed for additions to machinery already installed, which will be largely supplied by American firms, as in certain instances it is difficult for European manufacturers to match up this equipment, and when activity in the cotton spinning and weaving industry is renewed there will undoubtedly be opportunities for the sale, not only of American textile machinery, but of power plant equipment as well. It is usually the case that when the contract for a complete textile mill is taken the order for the power plant goes to the same supplier as does the order for the spinning and weaving machinery. American manufacturers encounter only British competition in this line.

Irrigation in Fukien

IN China, where rice has long been grown over a large part of the country, irrigation projects date back hundreds of years, although many of them, unfortunately, have long lapsed into desuetude. New projects and improvements to existing systems are promoted from time to time; hence the following details of a survey made of a district near Foochow by a civil engineer of Shanghai, Mr. E. T. Georges, at the invitation of the provincial authorities will be of interest, seeing that similar problems are encountered generally:

Records do not reach back to the time when this district, which is of 15,000 acres four miles south of Diongloh and 20 southeast of Foochow, was not irrigated. However, while there has been plenty of water available during the early part of the rice growing season, the second crop has seldom had sufficient water, and production in the district, which is one of the richest in the province, has been much less than the land should produce with sufficient water available during a longer period. With adequate means for making water available throughout the rice growing season, tens of thousands of dollars would be added yearly to the income of the inhabitants of the district. A wealthy Ling family in the district is partly responsible for the proposed project, which will be put through when conditions warrant.

The area to be irrigated lies between a range of mountains and the sea. The area is roughly L-shaped, the longer distance being parallel to the sea and the shorter distance terminating at the foot of the mountains at the village of Pehsan.

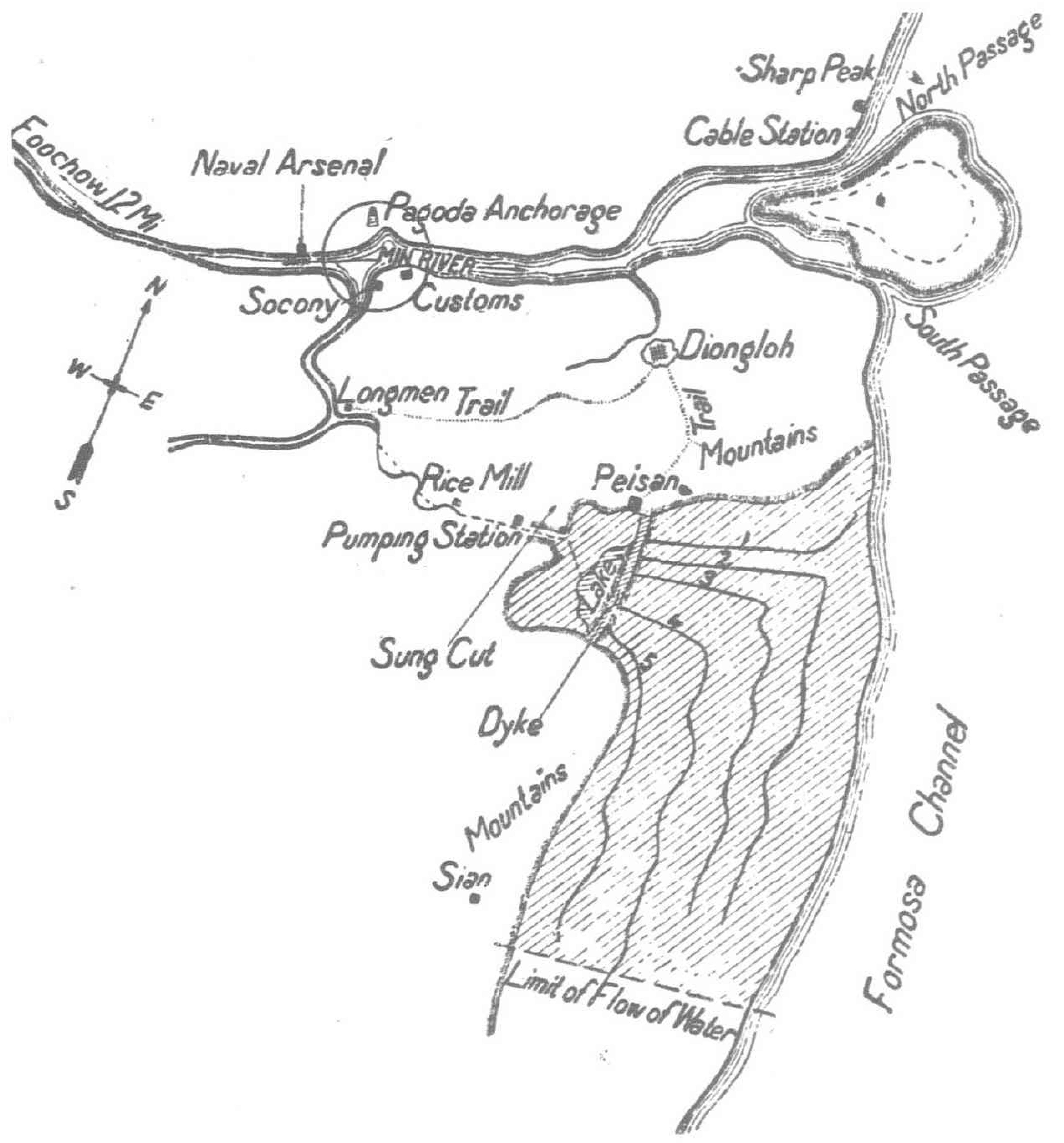
Practically all of this district is in rice. The area is covered by canals and ditches which are fed by leading to them the run-off from the mountain streams and by draining into them the run-off of excess ground and rain water from the rice fields. These canals are used as a storage basin against a dry period. The canals form a network over the entire area, except that part west of the Pehsan dike. This area is relatively small and is well watered by several streams and a small artificial lake at the outlet of the Shung Cut.

The need of water is felt particularly during the second rice crop. If a fair amount of rain falls in August, and the canals and ponds are filled, something of a second crop is assured. Those fields along the edges and for a distance of about 500 yards from the foot of the hills always have sufficient water, as the run-off is enough for their needs. It is natural that these fields are served first; in time of a water shortage it is the fields farthest from the hills that suffer. Reference to the accompanying map shows that this condition was appreciated by those who built the various canals.

East of the Pehsan dike the water is controlled by an elaborate system of water gates, allowing the water in any one, or all, of the canals to be diverted to any particular area. The water is taken from the canals to the fields by foot pumps. This method is crude, but it is inexpensive and has the advantage, in this case especially, of insuring against wastage. It is the traditional method of irrigation in this district, and its continuance would not be undesirable.

The network of canals with which we can concern ourselves, says Mr. Georges' report, extends as far to the east as the sea and as far south as Sian. The water at this point can be diverted by means of existing canals a few miles farther to the south and east, if necessary. The area south and west of this point depends upon run off from natural streams and water impounded in a lake at Pekhu. Natural obstacles make the delivery of water of this point impracticable.

In designing a plan for use here, the stipulation was made that the work must not cost in excess of a fixed sum, and it was thus designed to meet a particular expenditure. The approach was that of the greatest amount of water for the money available. Considering the area to be served and the distance the area is from any available constant source of water, it was evident that if any design could be made within the limit of the available funds, it must be one in which the strictest economy of design dominated, and every advantage of natural and existing conditions and resources made use of.



The Fukien Irrigation Scheme

At Longmen, located on a tidal tributary to the Min River, a small stream joins the river. This stream has its source at the Shung Cut. By deepening and widening this stream to the foot of the Shung Cut to Zero elevation, sufficient water can be obtained. From Longmen to the rice mill this stream is tidal. During the Sung dynasty the Shung Cut was attempted. This was to be a cut through the hill (see map). A considerable part of this work was completed and can be taken advantage of. From the pumping station to the top of the Shung Cut the water will have to be pumped through 2,500-ft. of pipe.

A number of trial designs, which after development proved impracticable, were considered. After consideration from all angles, this design is offered as the most practical, economical and foolproof. The river from Longmen (Station A) Elevation Zero to the rice mill (Station J) is fairly large and deep, the average width 75-ft. and the average depth from top of bank about 16-½-ft. (Elevation Zero is the height of lowest low tide water). From the rice mill to the pumping station between station O′ and station P′ practically an entirely new channel must be excavated. The entire channel from Longmen to the pumping station must have a depth at bottom equal to Elevation Zero and also must be wide enough to allow a small type of cargo junk to come to the station. A minimum bottom width of 10-ft. will be sufficient to accommodate this traffic. By cutting a new channel from station I to station O and station X to station J'., considerable distance will be saved. This will reduce the total number of yards to be excavated, as well as shorten the distance, compared with the length of the original channel. At the pumping station (between station O′ and station T′), a pumping plant must be erected.

The pumping station must have a capacity of 30 cubic ft. per second. The plant should consist of three single-stage double suction centrifigal pumps, 14-in. suction, 12-in. outlet directly connected to steam turbines. These pumps should deliver 4,500 gallons per minute each, or a total of 13,500 g.p.m. This is equal to 30 cubic ft. per second or 714 acre-inches per 24 hours. With a combined static and friction head of 80-ft., and assuming 65 per cent. efficiency, the power required will be 497 h.p. This head is higher than is recommended, but these figures will serve as a basis for estimate. Turbine drive is proposed as being the least likely to cause mechanical trouble. The smaller units can be used, due to higher speed. Any increase in cost due to this form of drive would probably be offset by the ease of, and decrease in cost of, installation and transportation of pumping units as a whole. Two boilers are preferred, but one suitable boiler can be used, as there is no doubt but that ample time will be available for shut downs for cleaning and repairs. A 36-in. discharge pipe will be sufficient. Steam is proposed as being the most practical prime mover. It is the most economical power for this district, as coal is available nearby (Formosa) and easily transportable from Pagoda Anchorage to the pumping station *via* the proposed channel. Experienced steam operators are to be had in this vicinity.

From the pumping station to the top of the proposed grade at Elevation 50 (50-ft. above Elevation Zero) the pipe line passes through the Shung Cut. There is some hard rock to be removed. If this work is found too expensive a saving can be made by carrying the pipe line to Elevation 70. This saving will be equal to 7,750 cubic yards. This, however, is not recommended as the additional power required to carry the water over the 70-ft. elevation would be considerable.

From the top of the Shung Cut to the west end of Pehsan lake the water will follow a natural channel. There is a small amount of clearing of the channel to be done and a small foot bridge to be built. At the outlet of the Shung Cut at Pehsan there is an existing pond formed by a dike across the outlet. This pond supplies part of the necessary water to irrigate the area north of the Pehsan dike. By building a short dike, not over 100-ft. long and 5-ft. high, this pond can be retained. At a small expense water from the pipe line can be diverted into this pond. This expenditure does not seem desirable as this area is not in need of additional water. In the event of its being in need, water could be taken directly from the canal leading to the Pehsan dike.

There are four canals supplied by the water impounded at the Pehsan dike. These canals form the main laterals of the network of canals east and south of this point. The entrance of water to these laterals is now controlled by placing two rows of parallel planks in the stone abutments of the outlets and filling the space between them with clay. It is proposed to substitute a simple under-shot type of gate operated either by crank or lever and ratchet. The existing stone structures can be utilized. A magneto type of telephone connection between the pumping station and the dike would be necessary. This would complete the design.

The proposed design involves no serious, natural, or engineering difficulties. Use is made of all existing structures and natural aids. The formation of the district lends itself better to the existing type of distribution system than any other. The rice fields are levelled and terraced so that the water is drained from one field to another. Any other system would have to be designed to operate on the same general plan, as it would not be practicable to change the existing levels and terraces of the fields. The use of Chinese foot pumps is an advantage and insurance against wastage of water. Gravity flooding would tend to wastage of water, intentionally or through carelessness. The existing canals are not only conveyers of water but are storage basins as well. All run-off water from the surrounding mountains is led to them, and excess rainfall from the rice fields is returned to the canals by the existing system of ditches. The people who live in the district are familiar with the present methods and would not object to their being retained, but would probably resent any change in system or method. Finally, the available funds are not sufficient to warrant the building of any additional or different type of distribution system.

The excavation work from Longmen to the pumping station is recommended to be carried out by use of a scoop or bucket type of dredge. The stream from Longmen to the rice mill is tidal and any other method would involve the use of coffer dams and pumps. There is little doubt but that the Zero Elevation between the rice mill and the pumping station is below the surface water level. This is indicated by the many shallow wells in the district. Before making a final estimate on this section of the work it is advisable to have test drills made to the Zero Elevation along the line of the channel. The formation of the surrounding country is such that it would indicate the probability of hard rock ridges being encountered.

It will be difficult to get coolie labor in any large number. Labor, when it can be had, commands $9 a month, plus housing and firewood. This would be equivalent to $10 per month. During the harvest season coolies cannot be had. The stronger and better class of coolies during the slack seasons in the fields work in the quarries and on the river, where they earn 40 to 50 cents a day. Not more than from 500 to 800 coolies can be used to advantage at one time in this work. Authorities in the district have expressed themselves against bringing in outside labor.

The cost estimate is submitted in eleven budgets:

Budget No. 1 covers the channel from Longmen to the pumping station. There are 220,000 cubic yards of earth to be removed. It is assumed that this work can be done for 60 cents a cubic yard. These figures are about twice the amount of what similar work can be accomplished for in the United States. This budget is for $132,000.

Budget No. 2 covers the mechanical equipment used in the pumping station. There are many types and styles of equipment which could be used satisfactorily, and it is believed that if a thorough search in the new and second-hand market were made, the figure of $112,000 could be reduced.

Budget No. 3 covers the purchase cost and laying of a discharge pipe 2,500-ft. long from the pumping station to the top of the Shung Cut. This is to be of 36-in. riveted pipe. The figures given are equal to the cost of material, labor, excavating and laying of cast iron water pipe in the States. In this case there would be considerable leeway, as the excavation is covered in Budget No. 5, and riveted pipe is from 25 to 30 per cent. cheaper per linear foot than cast iron, and there is a considerable saving in the number and costs of joints. This is for $37,000.

Budget No. 4 covers the building of the power house foundations and pump well. The most expensive part of this item is the building of foundations of the pump well. This cost will depend on the type of prime mover used. A reciprocating type of prime mover occupies greater space than that of a turbine. The building and foundations should be made of native stone or brick, which is reasonably cheap. The amount estimated should cover this expense. This budget calls for $19,000.

Budget No. 5 covers the reduction of the Shung Cut to Elevation 50. Approximately 12,000 cubic yards of rock are to be removed. These figures are based on an average width of cut of ten feet. If it is practicable to narrow this width, as aving can be made. As most of this rock is very hard, the removal will necessitate the use of explosives. One dollar per yard is estimated to be a safe figure. This budget calls for $12,000.

Budget No. 6 covers the excavation of approximately 1,300 yards of ditch from the Shung Cut outlet to the lake at the Pehsan dike; 2,000 cubic yards of soft material is to be removed. It is estimated that 36 cents per cubic yard will amply cover the excavation and trimming of this work. This budget calls for $720.

Budget No. 7 covers fixtures and work. This budget is estimated arbitrarily and is to be used for miscellaneous fixtures and work. It would cover the building of new water gates at the Pehsan dike, a 100-ft. dike at the Shung Cut outlet, the material for an installation of a telephone system between the dike and the pumping station and other unforeseen work and structures. This budget calls for $15,000.

Budget No. 8 covers the foreign and Chinese non-productive help and expense. It covers subsistence, transportation and wages. The amount estimated is two-thirds of the total expenses providing the entire staff were used during the entire construction period. The amount of this is $20,000.

Budget No. 9 covers expendible and new equipment, such as tools, explosives, rope, lumber and nails. There will be some salvage of this equipment upon completion of the project, but this has not been taken into consideration. The amount of this budget is $15,500.

Budget No. 10 covers repairs and buildings at headquarters, storage sheds and other small buildings. This also has a salvage value which is not taken into consideration. This budget is $5,000.

Budget No. 11 covers miscellaneous expenses, such as medical attention, printing, liability claims and other miscellaneous expenditures of a similar nature. This budget is for $6,000.

This makes a total of $374,220. It was estimated that the larger yield would in ten years pay for the cost of the work plus interest and upkeep during that period.

Dutch East India Railroads

OF the Islands of the Dutch East Indian Archipelago, Java (with Madura) has the most extensive railway and tramway system viz. 5.339 k.m.; Sumatra follows with 1.531 k.m. and Celebes closes with a tram line of 47 k.m. length.

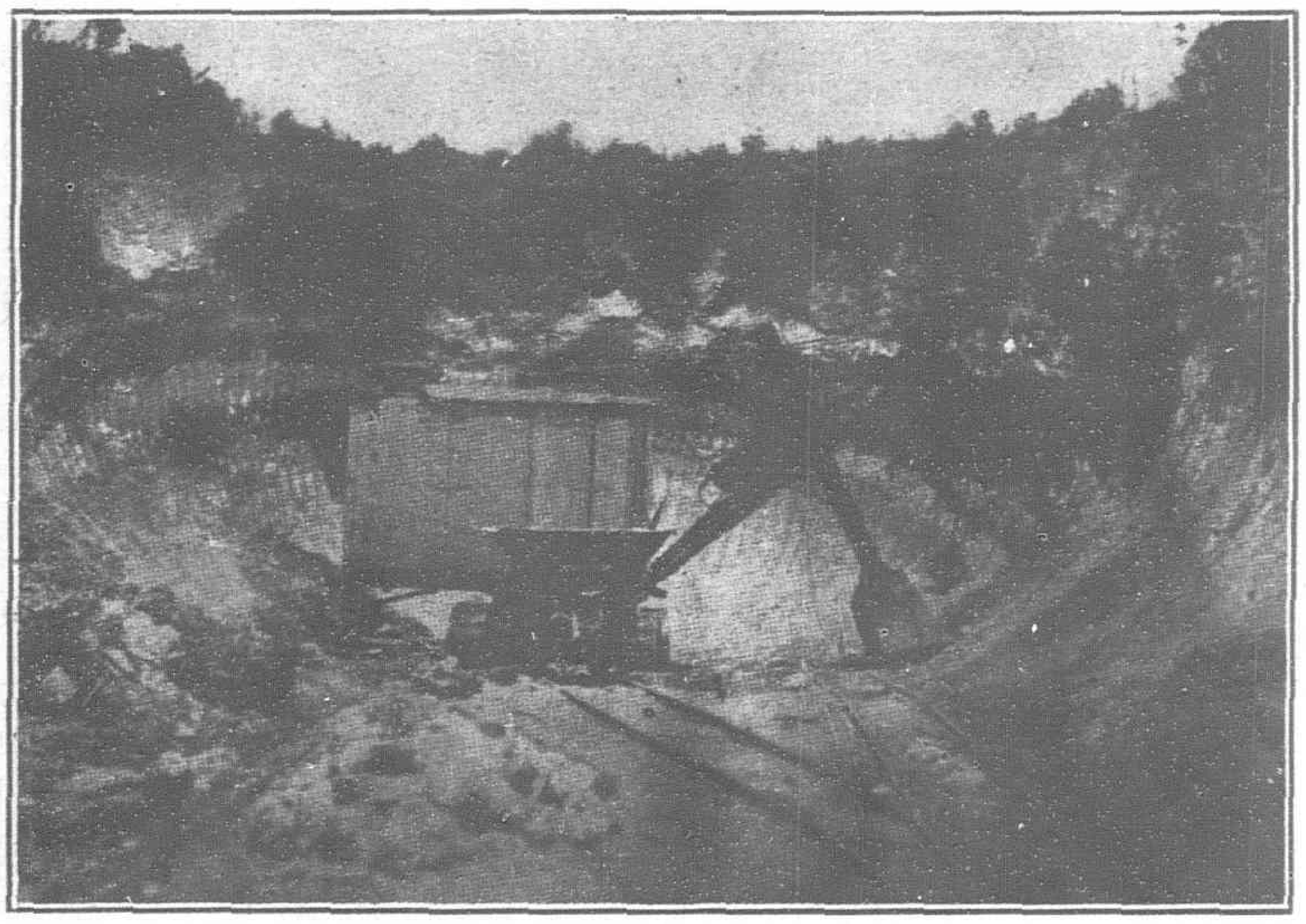
In Java and Sumatra, part of the railways are run by the Government and another part by private companies; the tramway in Celebes is run by the Government.

The dense population, the great number of estates and industrial concerns and also the presence of ports with modern appliances, accessible to ocean steamers with heavy draught, are factors, for Java which have caused the speedy development of the railroad traffic.

For the through passenger traffic between East, Central and West Java express and fast trains with mail type bogie passenger carriages and dining car are daily running over two routes, a mountain route, offering beautiful scenery and a shorter route over the plains, but less interesting from a scenic point of view.

For passenger traffic on short distances ordinary passenger and mixed trains are running. Goods are transported by mixed and goods trains.

The chief traffic centres in Java are the coastal towns Batavia and Sourabaya, which now have modern ocean harbors, through which passes the bulk of the import and export trade, and Samarang. Of less importance are Tjilatjap Djocjakarta and Bandung.



American-made Steam Shovel Cutting a Path through the Sumatra Jungle. *The Baldwin Locomotive Works Supplied this Shovel*

The length of the State Railways in Java at the end of 1922 amounted to 2.839 k.m., of which 2.719 k.m. with the usual Java gauge of 1.067 m. and 120 k.m. narrow gauge railways with a width of 0.60 m.

At the end of 1923, 4,033 kilometers or about 2,500 miles of state railways and 2,908 k.m. or 1810 miles of private railways were opened to traffic, of which 5,317 k.m. in Java, 1,577 k.m. in Sumatra and 47 k.m. only in Calebes.

Dutch Borneo has no railways as yet although a big railway scheme has been Contemplated for some years, and several railway concessions have been granted to private companies.

The financial results of the working of the state railways over 1922 and 1923 were as follows:

		1922	1923
Lengths of lines open	kms.	3,978	4,033
Capital Outlay in Guilders		463,476,384	492,353,622
,, ,, per kilometer		116,500	122,100
Gross Earnings	gld.	74,574,405	69,041,260
Working Expenses	,,	66,630,292	53,312,167
Renovations and Depreciation ..	,,	3,044,271	3,306,107
Pensions and Miscellaneous ..	,,	2,843,010	3,795,383
Net Earnings	,,	2,056,832	8,627,603
Percentage of working expenses to gross earnings		89%	76.5%
Percentage of net earnings to capital ..		0.43%	1.75%

Although the gross earnings in 1923 were less than in 1922 by 5.5 million guilders the net earnings were much more in 1923 owing to the great reduction in the working expenses.

As the accounts of the 2,284 kms. state railways in Java are kept apart from the so-called tramways in Java and in the other islands, the undermentioned figures concern only the working of this 2,284 kms. in 1922.

The rolling stock consisted of 552 locomotives, 1,347 luggage and passenger cars and 14,587 goods wagons.

The amount of passengers carried was 59,159,024 and of passenger kilometers 1,628,726,439, 51,528 tons of luggage and 5,963,044 tons of goods. Total ton milometers were 540,370,044 with an average receipt per ton k.m. of 0,053 guilders.

The number of train kilometers were 15,197,115 and 342,949 tons of coal were used, which amounts to 16,459 kilogram per engine kilometer and 22,491 kilogram per train kilometer or the same as about 80 lbs. per train mile.

Under more normal conditions the net earnings should amount to 6 to 8% of the total capital outlay and in order to increase the receipts it was some years ago decided to use electric traction on the lines, where the traffic was going to be too heavy to deal with in the ordinary way. This scheme has been delayed very much but in the course of 1925 it is hoped much will be done. Brick Construction, it is expected, will be started on a few short lines out of Batavia. The hydro-power stations are nearly finished and some of the electric motor cars have arrived from Europe.

The construction of new railway lines has almost come to a standstill. The big scheme of the building of a total of some 3,000 kms. of new lines in Sumatra, Borneo and Selebes has to be abandoned owing to the general decrease in trade and consequent failure of the revenues of the government.

At the present time there is only about 100 k.m. new line under construction in Sumatra, the last link of the line Telpkbelong-Palembang.

Forests of the Russian Far East

(*Continued from page 219*)

a very costly operation. Furthermore the estuary of the Amur is blocked by a sandbar with only two channels, (A) the southern channel, opposite Cape Pronge, with a depth of 12-ft. (14-ft. at flood tide) and (B) the northern channel, some 18-ft. deep, so that sea-going craft with a draft of 24-ft. are unable to enter the Amur.

All this reflects very unfavorably on Nikolaevsk as a sea-port for the basin of the Amur river and the prospective concessionaire will have to look for another port for the export of his timber. This he will probably find in the De Castries Bay which, at an enormous cost to him, he could connect by rail with Sofiisk. The construction of a harbour there will also cost quite a tidy sum, but then, aside from obtaining a very convenient and safe harbour, the concessionnaire will save some 300 miles, *i.e.*, the distance between De Castries Bay and Nikolaevsk.

Another advantage offered by a harbour at De Castries Bay lies in the fact that this bay is in close proximity to the Nikolaevsk, Lower-Amur and Kut-Urmiiski concessions with an aggregate area of 1,000,000 dessiatines of forests and an average yearly yield of 20,000,000 cub. feet of timber. A saw-mill at De Castries Bay could cut this amount of timber from the said concessions and even double this output. All this timber would find a good market in China and Japan.

The most important factor in the restoration and further development of the timber industry in the Russian Far East is the participation of foreign capital, preferably American capital, which could obtain all the timber it might require for export to Australia, Japan and China from the basin of the river Amur.

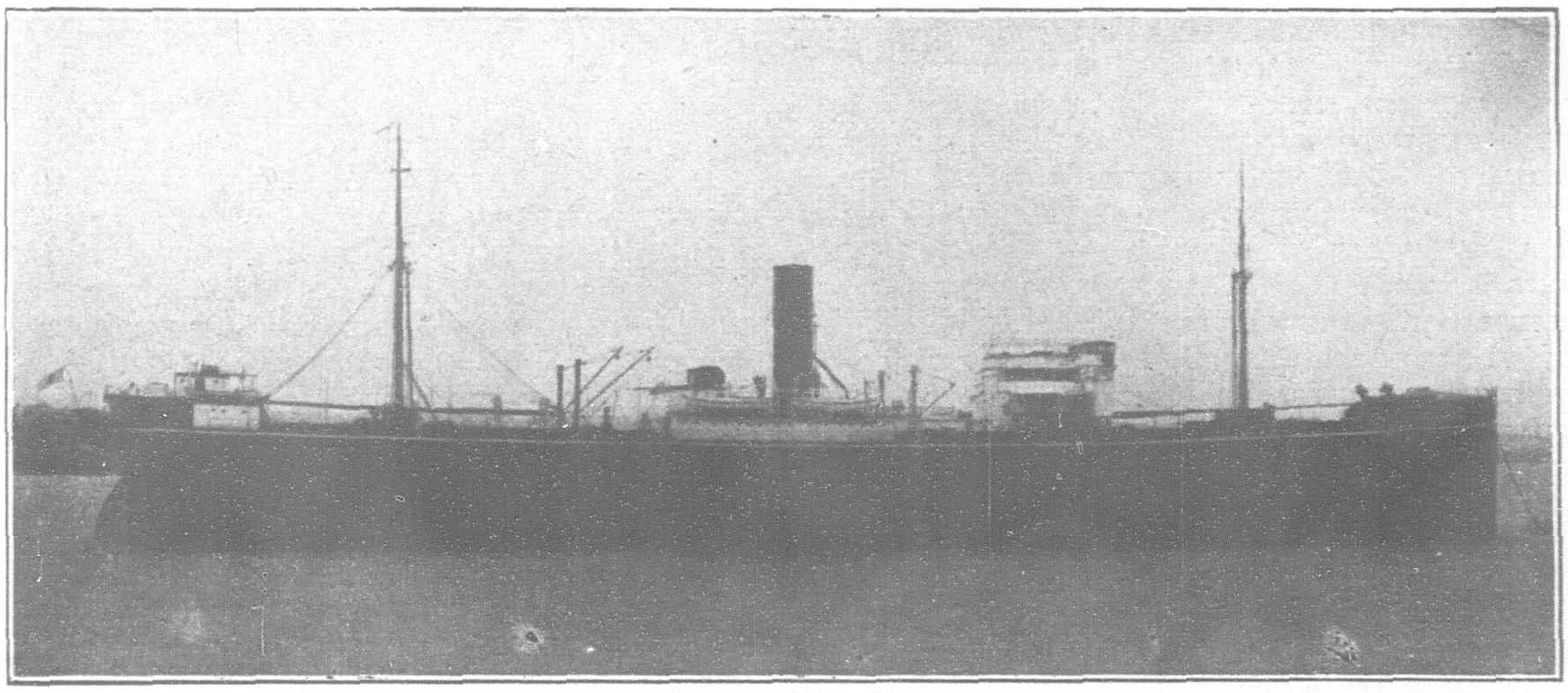
The "Atago Maru" and the "Asuka Maru"

THE *Atago Maru* and the *Asuka Maru* represent the first large ocean-going oil-engined craft to sail under the Japanese flag, and, apart from this, great interest centres in the fact that the hulls are identical in size, were built to the same plans, have equal machinery power, but are equipped respectively with Sulzer two-stroke and Harland and Wolff—B. and W.—four-stroke machinery. They form modern examples of two-stroke and four-stroke-engined vessels, so that the most exact comparisons may be made between the commercial advantages of the two classes of plant, more particularly as each is provided with a thoroughly comprehensive all-electric auxiliary equipment. The *Asuka Maru* was built by Messrs. D. and W. Henderson, and the *Atago Maru* by Messrs. Lithgows, Ltd. Messrs. Harland and Wolff supplied the engines for the former and Messrs. Sulzer Bros. for the latter, in which the installation was carried out by Messrs. David Rowan & Co.

The following are the main particulars of the vessels :—

Length b.p.	440-ft.
Beam	57-ft.
Moulded depth	38-ft. 6-in.
Loaded draught	28-ft. 3-in.
Total deadweight capacity	10,500 tons
Fuel oil carried, about	2,000 tons
Machinery power	4,000 s.h.p.
Sea speed	12 knots
Daily fuel consumption about	17 tons

The vessels are very high-class cargo boats of the shelter-deck type, having accommodation for the crew in a top-gallant forecastle forward and in deck houses aft, the officers and engineers being berthed in well-fitted accommodation in deck houses amidships.



"Atago Maru"

There are seven watertight bulkheads extending to the shelter deck, and a deep tank, having two watertight hatches and fitted for the carriage of cargo oil or water ballast, is placed aft of the engineroom bulkhead. These bulkheads divide the ship so that there are three holds forward and two aft of the engine-room, making five large holds in all, exclusive of the deep tank. The shelter deck is, of course, steel throughout and sheathed in wood amidships, and there is a main deck, also of steel, extending fore and aft, forming five large 'tween decks exclusive of the spaces in way of the fore and after peaks. In way of No. 1 and No. 3 holds, a third deck of steel has been fitted, forming double 'tween decks in these spaces. There are five big hatches to the holds and a smaller hatch in way of the deep tank. These hatches are unusually large, No. 2 and No. 4 being 35-ft. and 32-ft. long, respectively. The double bottom is constructed for about 1,200 tons of fuel oil or water ballast, and in addition the deep tank and fore and after peak tanks hold about 1,250 tons water ballast.

A prominent feature of each vessel is the complete installation of cargo-handling gear. There are 18 electric-driven winches distributed as follows :—

At No. 1 hatch	3 winches	of 3 tons.
,, ,, 2 ,,	3 ,,	,, 3 ,,
,, ,, 2 ,,	2 ,,	,, 7 ,,
At No. 3 hatch	2 winches	of 3 tons.
,, ,, 4 ,,	2 ,,	,, 3 ,,
,, ,, 5 ,,	2 ,,	,, 5 ,,
,, ,, 5 ,,	1 ,,	,, 3 ,,
,, ,, 6 ,,	3 ,,	,, 3 ,,

There is also an electrically driven five-ton winch in the steering house aft, which is required for warping and can be adapted for steering in the event of the steering gear breaking down. The arrangement of the 20 cargo derricks which are fitted is as follows :—

At No. 1 hatch	3	of 6 tons.
,, ,, 2 ,,	3	,, 10 ,,
,, ,, 2 ,,	2	,, 3 ,,
,, ,, 3 ,,	2	,, 3 ,,
,, ,, 4 ,,	2	,, 3 ,,
,, ,, 5 ,,	3	,, 10 ,,
,, ,, 6 ,,	3	,, 6 ,,

In addition there is a 40-ton derrick at No. 2 hatch and a 20-ton derrick at No. 5 hatch.

The steering gear, fitted by Messrs. Caldwell & Co., is of the Hele-Shaw electric hydraulic type with telemotor control from the bridge amidships and also having a control on the docking bridge aft. Each vessel is fitted with a funnel placed amidships and this has been utilized for holding the main silencers, donkey boiler uptake, auxiliary Diesel silencers, exhaust pipes, a hot-water tank, etc.

Hot salt-water and cold fresh-water have been laid on the accommodation fore and aft, and with ample electric lighting throughout it may be said that the vessels have been finished in a very complete and up-to-date fashion. A wireless installation, supplied from Japan by the owners, has been fitted in each case.

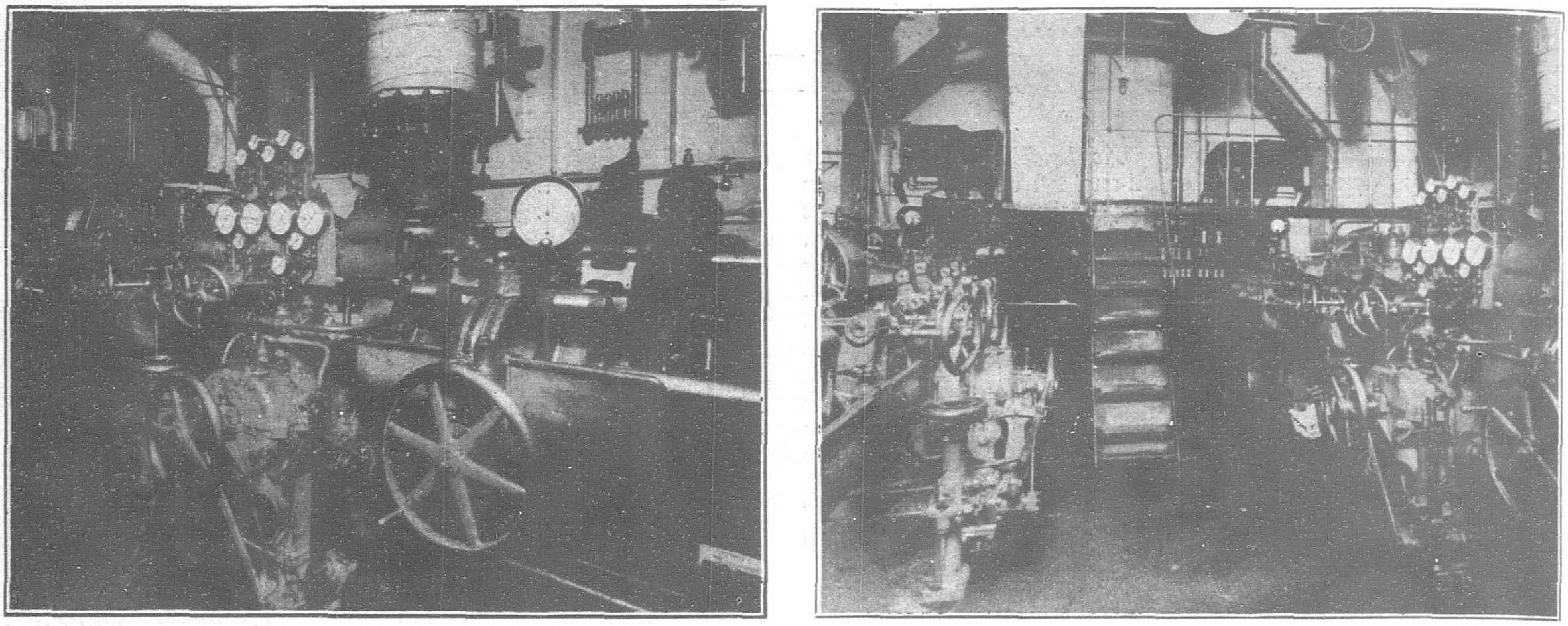
The winches, although equal in number and designed for the same service, are of different types, those on the *Asuka Maru* being the new Laurence Scott worm-gear-driven type and those on the *Atago Maru* manufactured by the Sunderland Forge and Engineering Co. The usual contactor houses are provided.

We may now deal with the respective machinery arrangements, and reference in this connection may be made to the engine-room plans attached hereto.

M.S. "Asuka Maru"

The 2,000 b.h.p. engines of this ship are eight-cylinder sets with a bore of 680 mm. (26¾-in.) and a stroke of 1,100 mm. (43¼-in.) the normal speed for full power being 125 r.p.m. They have twin compressors driven off the forward end of the crankshaft and the only difference we noted from the earlier standard Harland and Wolff engine was a mechanism for altering the lift of the fuel valves for slow running, to economize blast air.

The large horizontal handwheel seen at the control station gives a slight turning movement to a horizontal shaft—the whole length of the engine—and this shaft has levers attached to it which at their upper ends are fixed to the bosses on which the fuel valve levers are pivoted. If the handwheel is turned, therefore, the lift of all the



Engine Room of the "Atago Maru"

valves is increased or decreased as desired, and we were informed that with this arrangement it is possible for the engines to be kept turning at a minimum of 22 r.p.m. This method has, of course, frequently been adopted with long-stroke engines on single-screw ships, but we understand it is now standard on all Harland and Wolff twin-screw vessels. In addition to economizing blast air, it is of obvious value in circumstances where reduced speed is called for over a period of several hours, as, for instance, when, in approaching port, it is found that there is no object in arriving before a certain time.

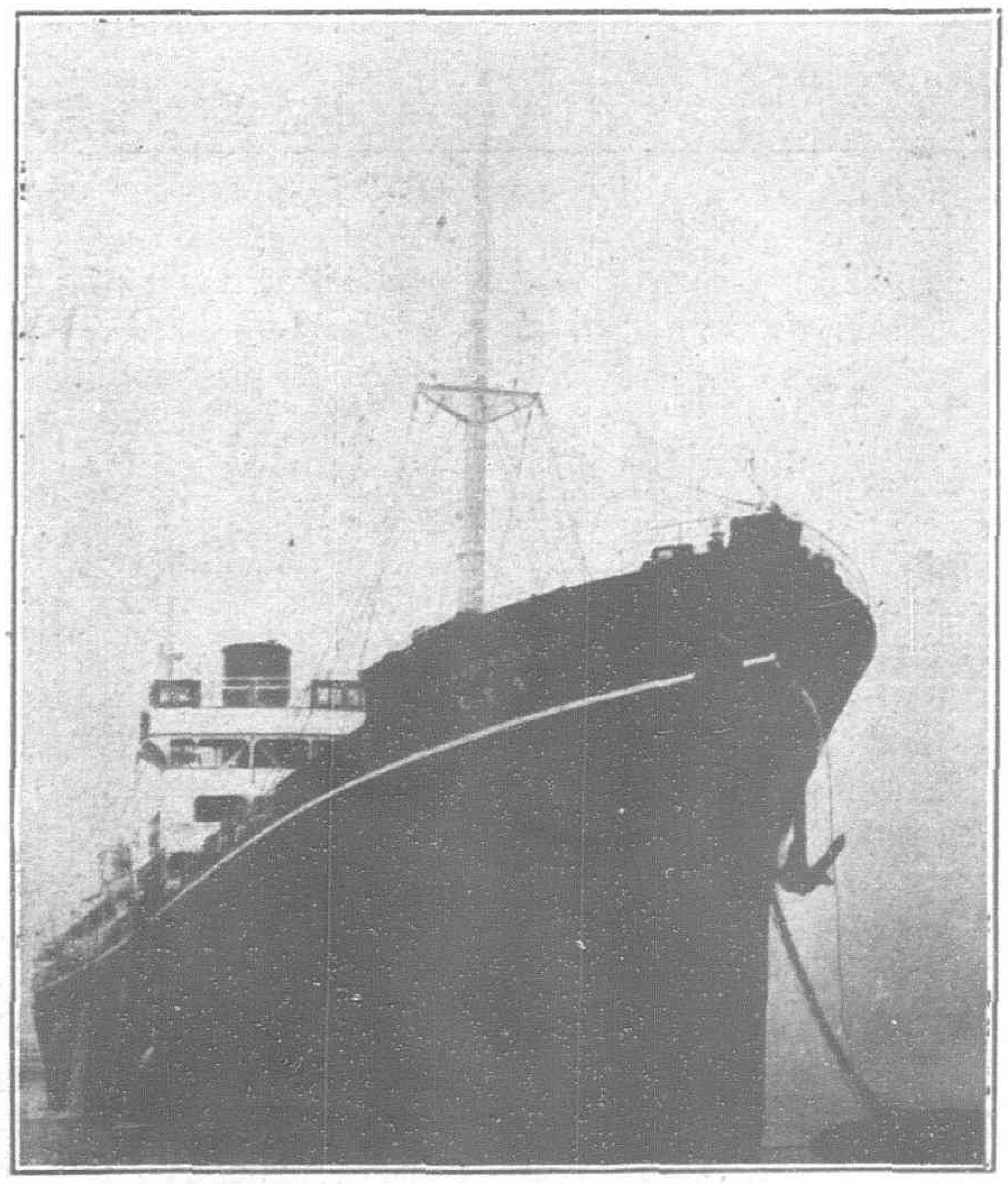
A new measuring instrument has been added to the engines for ascertaining the lubricating oil temperature at any moment. It is manufactured by the Fox Instrument Co., and consists of a tube which is full of mercury and is immersed in the lubricating-oil pipe leading from the sump to the oil cooler, *i.e.*, when the oil is at the highest temperature. To read the temperature the circuit of the instrument is pumped up by hand to a pressure of 10-lb. per sq. in. and the temperature is indicated on a mercury thermometer.

The usual arrangements are made for heating the circulating water in the cylinder before starting up, if desired, and steam pipes are led to the cylinder covers for this purpose. The cylinders, covers and compressors are sea-water cooled, but a closed fresh-water circuit is provided for the pistons with a water cooler in the engine-room, where is also located the lubricating oil cooler, with a surface of 200 sq. ft. The circulating pumps draw water from the sea, delivering it first to the lubricating oil cooler, next to the pistoncooling water cooler and then to the engines, where it can either pass first through the compressor cylinders and intercoolers, or in parallel to compressors and cylinders. These circulating pumps also supply the cooling water to the auxiliary Diesel engines, although, when in port, water can, if desired, be obtained from the boiler feed water pump.

The three Diesel-driven generating plants of 100 kw. each are located in line on the port side of the engine-room. The engines, of 150 b.h.p., have three cylinders, 325 mm. bore with a stroke of 350 mm. and the speed is 300 r.p.m. The voltage is 220 and this is used throughout the ship for lighting as well as power. One plant will be in operation at sea, and two in port when cargo is being handled. Between the two propelling engines is a 20-ton motor-driven gear pump, drawing oil from the double bottom and delivering it to the two 10½-ton settling tanks and also to the galley, which is oil-fired. Aft, and also centrally placed, are three lubricating oil pumps similar to that for fuel. Usually, when the oil is thick, one will suffice for both engines, but when the oil is hot two will be required.

On the starboard side of the engine-room is most of the remaining auxiliary equipment; the two-stage Harland and Wolff air compressor compressing up to 25 atmospheres, or 360-lb. per sq. in., is driven by an Allen motor of 180 b.h.p. This charges three 530 cub. ft. cylindrical receivers, and there is a small emergency steam-driven compressor which can supply sufficient air at 1,000-lb. per sq. in. to charge one injection air reservoir in one hour. The ballast pump, of 200 tons hourly capacity, is of the Carruthers plunger type, driven by a 22 h.p. motor, and a duplicate is provided for discharging cargo oil from the deep tank.

The two sea-water circulating pumps, to which reference has already been made, are centrifugal machines of 180 tons output per hour, directly driven by 23 h.p. motors, but the duplicate piston-cooling pumps are of the Carruthers plunger pattern, each capable of delivering 40 tons of fresh-water per hour at a higher pressure than that of the sea-water circulation. A 100-ton vertical Carruthers bilge pump is installed and a multi-stage centrifugal fire-service pump delivering 30 tons per hour at 100-lb. per sq. in. The lubricating oil can be purified by a De Laval centrifugal separator. In the double bottom is a 25-ton lubricating oil tank, as well as one of 30 tons capacity for fresh-water for piston cooling. A vertical Cochran boiler with a heating surface on 200 sq. ft. is fitted at the forward end of the engine-room, mainly for scouring out tanks, since the accommodation is heated by Electro-vapour radiators.

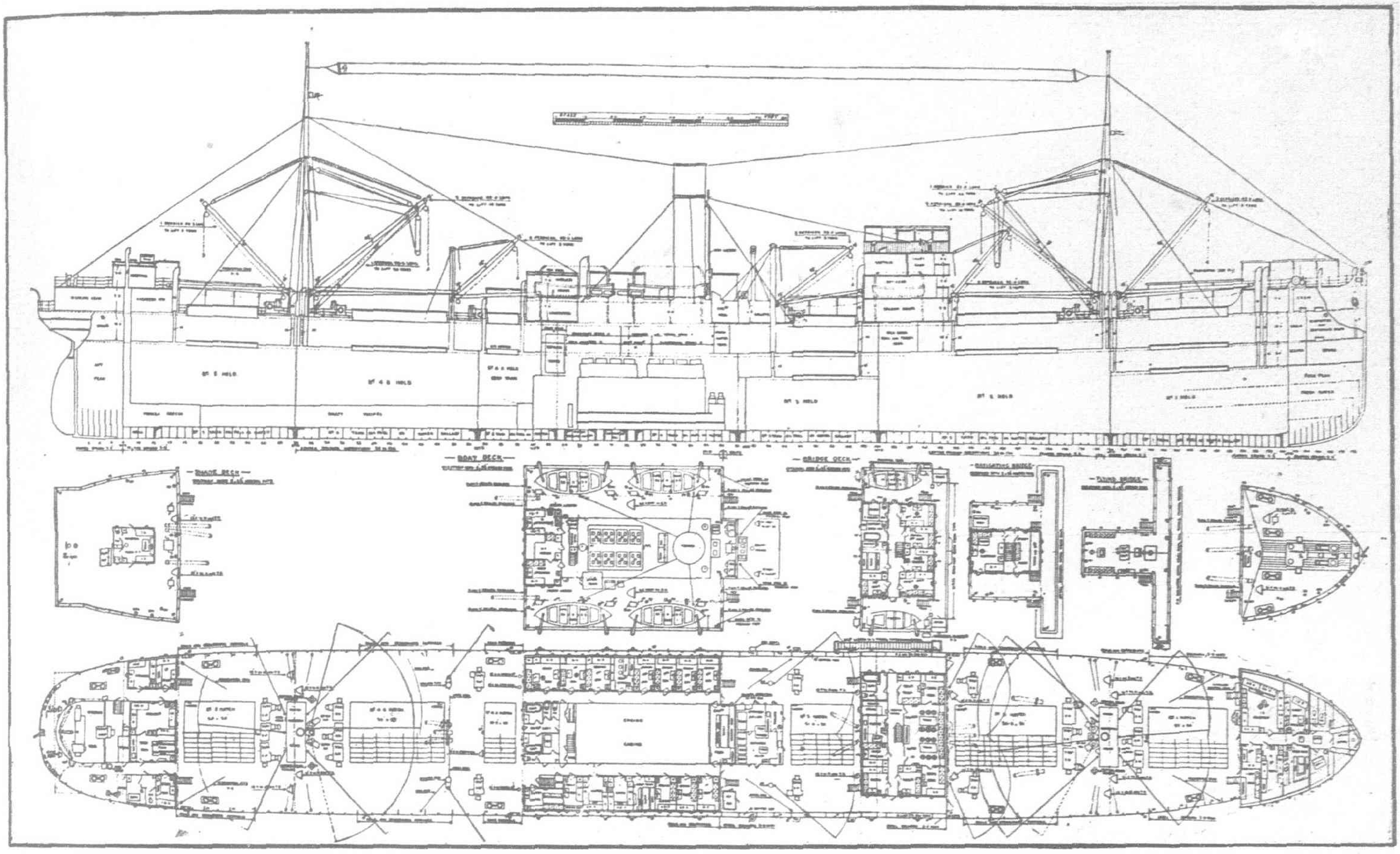


"Atago Maru." Another View

The "Atago Maru"

The two Sulzer engines in the *Atago Maru* are designed to develop their output of 2,000 b.h.p. each at the lower speed of 100 r.p.m., and they have four cylinders, curiously enough with the same diameter as those in the other vessel, namely, 680 mm., but with a stroke of 1,200 mm., thus giving a piston speed of 807-ft. per min., against 902-ft. per min. with the four-cycle engines. They are completely standard motors with the new automatic disc-type scavenging valves, adopted, we believe, for the first time in this ship.

The controls, as is usual with this class of machinery, are all at the top of the engines and differ in no respect from the arrangement which have already



Plans of the 10,500 Ton M. S. "Asuka Maru"

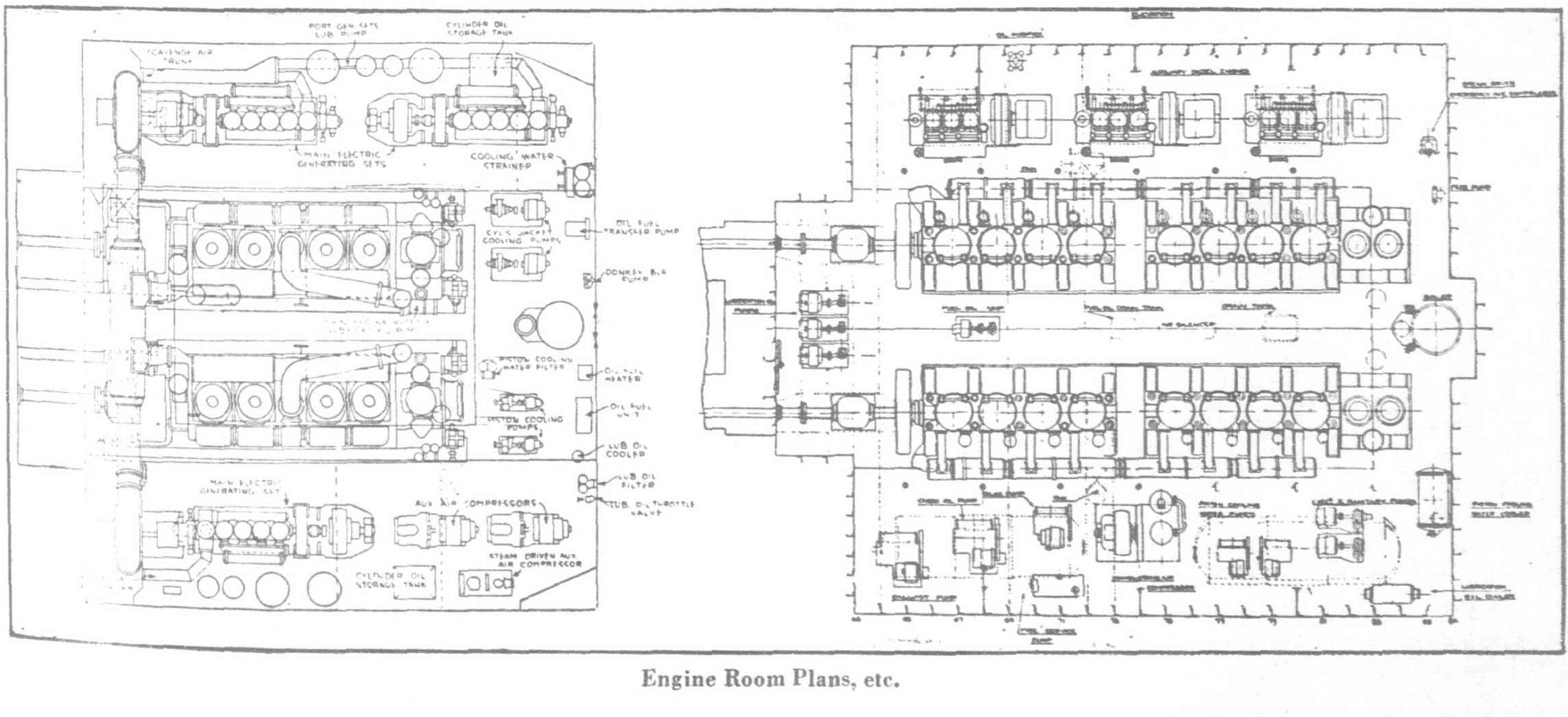
been described. Each engine has but one injection air compressor, driven off an extension of the crankshaft at the fore end, and one compressor can, if need arise, supply a sufficient volume of injection air for both engines. A large surplus therefore exists normally for charging the starting-air reservoirs. There are eight injection-air bottles, each with a capacity of 28.2 cub. ft. at 1,000-lb. per sq. in. Both engines have an overhung crank at the forward end driving the cross-head lubricating-oil pump with a delivery pressure of 300-lb. per sq. in., a lubricating-oil pump discharging to the gravity tank, and a bilge pump. The consumption of each engine is guaranteed not to exceed 0.418-lb. of oil per b.h.p. hour.

The two turbo blowers for the supply of scavenging air are at the top of the engine-room. They are arranged one on each side, with the blower in an enclosed compartment drawing air direct from the deck and the electric motor external to this chamber. Both are of the Brown Boveri type, with a maximum capacity of 19,100 cub. ft. per min., at about 2,750 r.p.m., and they are direct-coupled to 220-volt d.c. motors of 240 b.h.p. One will supply more than sufficient air for both engines when operating at full speed.

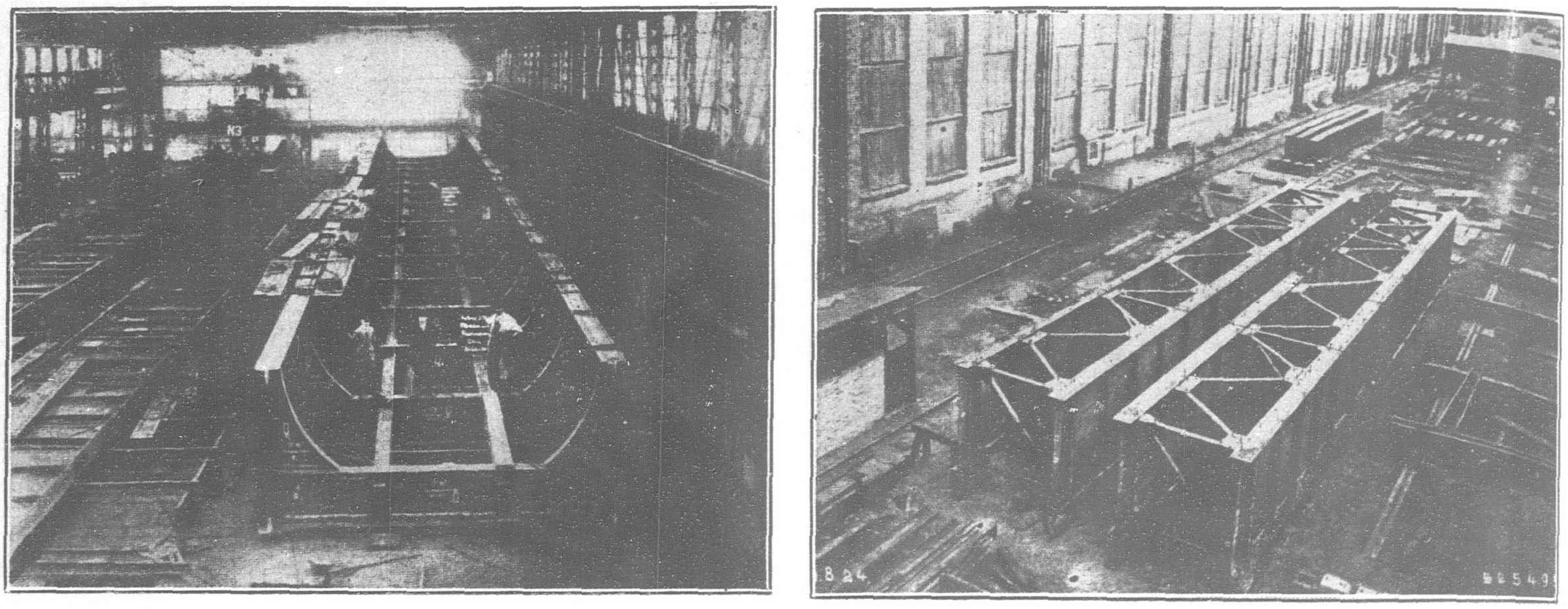
Airless Injection Auxiliary Diesel Engines

The auxiliary generating plant represents a departure from usual practice, as it is the largest installation of the new Sulzer airless injection Diesel engines we have yet seen. There are three sets, two of which will have to be continuously in operation on account of the requirements of the turbo blower. Each dynamo generates 135 k.w. at 300 r.p.m. and 220 volts and is driven by a four-cylinder

(Continued on page 231).



Engine Room Plans, etc.



The types of girders now being erected in the Kiao-Tsi Railway. The through girder and the deck girder. Pictures taken in Germany at the workship

Reconstruction of the Kiaochow-Tsinan Railway Bridges.

By F. K. Sah, Chief Engineer

THE existing bridges on the Kiaochow-Tsinan Railway, were put up by the German Engineers in 1901-1904. They are the type of bridges specially designed in Germany for colonial lines where the loading adopted is generally very light. But due to the rapid increase in the volume of traffic on this line, heavier locomotives had to be resorted to, consequently the factor of safety of these bridges decreased correspondingly.

Before the great war the German Engineers had worked out a plan for the strengthening of some of the important bridges on the line, but this plan had never been carried out. By adopting still heavier American locomotives of the Pacific and Consolidation Types (E-35 loading) during the Japanese Administration, 1914-1922, these bridges were further decreased in their factor of safety. Even if the German plan of strengthening had been carried out, the factor of safety would still be too small to carry these heavy American locomotives according to the American practice in bridge designs.

Since the taking back of the railway by China it was obvious that many necessary improvements of the Railway must be carried out and the bridge question being the most important was the first to be taken up. Upon the strength of the bridges depend the choice of the locomotives and rolling stocks which in turn effect the speed of the trains and the hauling capacity of the line.

At first the plan proposed for strengthening the bridges was to make use of the old structures by doubling up two trusses into one and encasing the small plate girders in concrete. But this plan was abandoned because it could only strengthen the bridges sufficiently to stand the present loading, making no provision for the increase in loading which is inevitable in the very near future. So finally it was decided to replace all the existing bridges by new bridges of Cooper E-50 which is the standard loading for new main lines of the Chinese Government Railway System.

Before this plan of changing all bridges to E-50 loading could be carried out, a temporary measure was planned and adopted to make the running of trains over existing bridges in the meantime as safe as it is within the power of the engineering department to make them. This temporary measure includes the changing of all loose rivets, repairing of cracks and bent members, constructing timber bents where possible to lessen the strain on the structural members, and strengthening of weak joint connections particularly the centre diagonals and stringer connections.

The bridge program, as finally adopted, involves the scrapping of approximately 847 spans of minor and 150 spans of major bridges aggregating a gross tonnage of approximately 8.500 tons and the replacing by approximately equal number of new bridges aggregating a gross tonnage of approximately 15,000 tons. The total cost of the entire program, including cost of handling, dismantling, erection and the remodelling of piers and abutments, etc. is estimated at M.$3,800,000. The work of reconstruction is to be started in March, 1925 and to be completed in three years.

The following types of bridges have been adopted :—

1 m. to 3 m. spans ;	Old rails, old channels, or I-beams imbedded in concrete.
4 m. to 10 m. spans ;	I-beams imbedded in concrete.
12 m. to 30 m. spans ;	Plate girders.
35 m. to 46 m. spans ;	Trussed bridges.

At the time of writing 33 plate girders of 15 m. to 30 m. spans aggregating 2,180 tons have already arrived at Tsingtao. Orders for these bridges were placed with G. Borkowetz representing Machinen-Fabrik Angsburg—Nuernberg, Germany, on May 24, 1924, at the unit cost of G.$82.80 per ton C.I.F. Tsingtao. The first shipment consisting of 17 spans arrived at Tsingtao on November 8 and the balance of the entire order arrived at Tsingtao on February 10, 1925.

The contract for the reconstruction of 26 spans had just been awarded to Yu Ching Construction Company of Shanghai at a total cost of $56,262. According to plan these 26 spans are to be erected by end of May, 1925.

The Tientu Light Railway

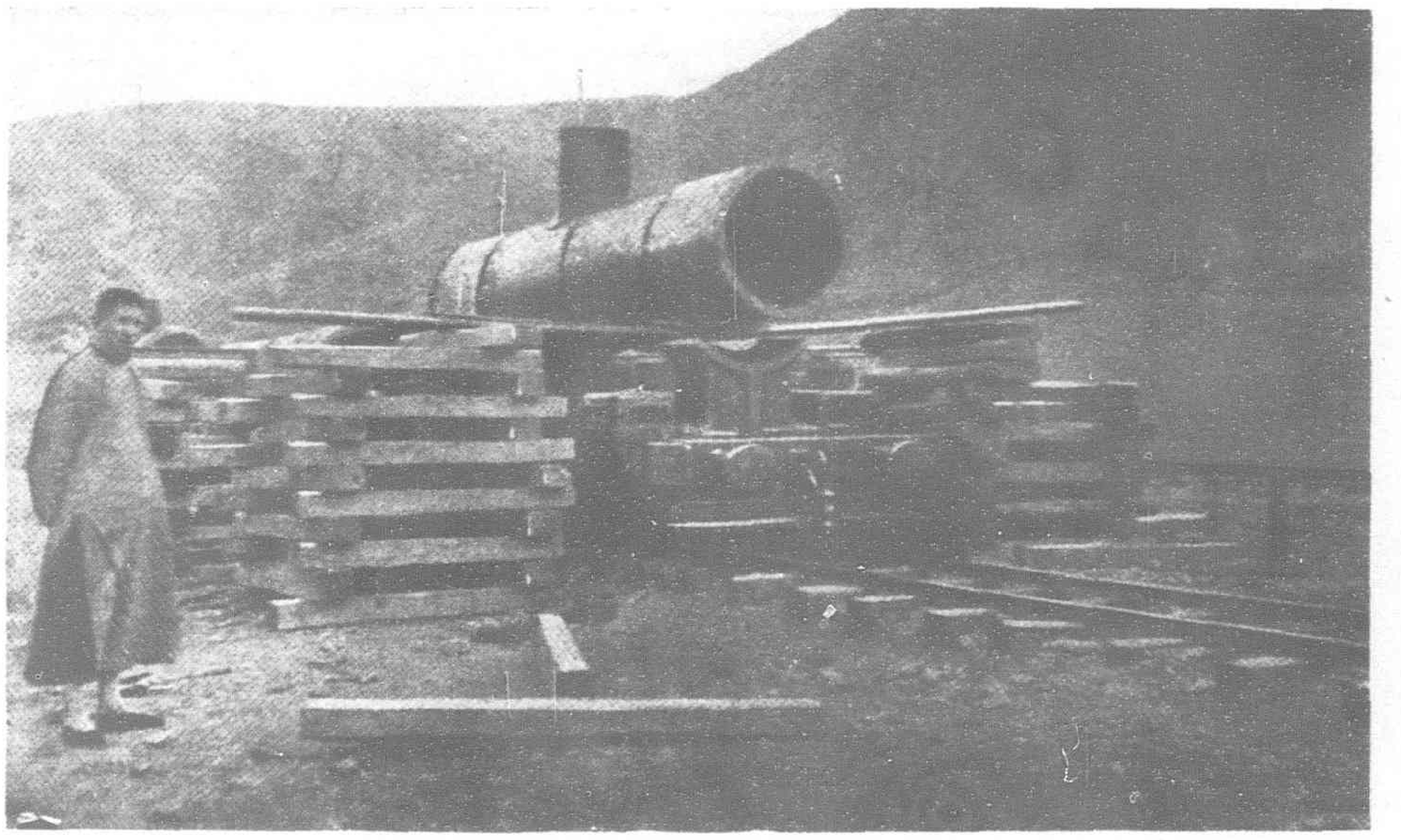
By *J. W. Kelker*

THE project for the construction of a light railway in Kirin province, North Manchuria, has its inception in 1915. This railway was to start at the Chinese border on the Tumen River, twenty-five miles North of Kwainei at a small town known as Tumen River Siding, opposite Komosanbon, and extend to the Tienbaushan silver and copper mines, a distance of seventy-three miles. In addition, a branch line six and a half miles long was to be constructed, making a total of seventy-nine miles.

The Tienbaushan mines, which include a smelter and refinery, were built in 1915. Rapid progress was made in development work and operations continued until 1919 when they ceased on account of the low market of price of copper. These mines, however, have recently resumed operations.

As laid down in the project the work called for the construction of a light railway of 2-ft. and 6-in. gauge, with 25-lb. rail, to connect the Tienbaushan Mines, at Komosanbon, with the Tumen River Light Railway operating in Chosen along the border of China. At first the Chinese were opposed to the construction of this line, but in the latter part of 1922 a joint Chinese-Japanese stock company was organized with a capital of four million yen and stock equally divided, that is, 50 per cent. Chinese and 50 per cent. Japanese, and work on the new line, which was known as the Tientu Light Railway, was begun. The company was organized as follows: Chief Director, Chinese, Mr. Tao, Chinese Governor at Yenkiting; President, Japanese, Mr. Iida, of Tokyo; a dual management consisting of Mr. Ishibashi, Japanese General Manager, and Mr. Chia, Chinese General Manager; Chief Engineer, Japanese, Mr. Fukai, under whose jurisdiction came the superintendence of the surveys, track equipment, buildings, and the construction of the railway.

Construction work on the first division, thirty-six miles long, to Lungchingtsun, proceeded rapidly through a hilly and even mountainous country which made it necessary to lay out a line with grades as high as 1.7 per cent. and with numerous curves of 264 ft. radius. This division was opened for traffic on October 10, 1923.


Ready to Lower Boiler, Running Gear in Place

The second division, from Lungchingtsun to Laotaokou, a distance of twenty-seven miles with a six and a half miles branch line to Yenkiting, was graded in the fall of 1923 and the spring of 1924 and new rails and track laid in July, 1924. It is expected that this division will be complete and in operation early in 1925.

The third division, from Laotaokou to Tienbaushan, a distance of ten miles, will in all probability be graded early in 1925.

Since the construction of the railway many small villages have sprung up, and in the town of Lungchingtsun almost a thousand new houses have been constructed and many new streets laid out, graded and surfaced. Every town has a well-built station with waiting rooms for passengers and quarters for the station men. The main offices and shops of the railway are located at Lungchingtsun. The shops are built in connection with the round house and have equipment sufficient to handle running repairs. The machine shop is equipped with a wheel lathe, hydraulic press, three small lathes, a shaper and a milling machine. The power to operate the machinery is furnished by gasoline motor.

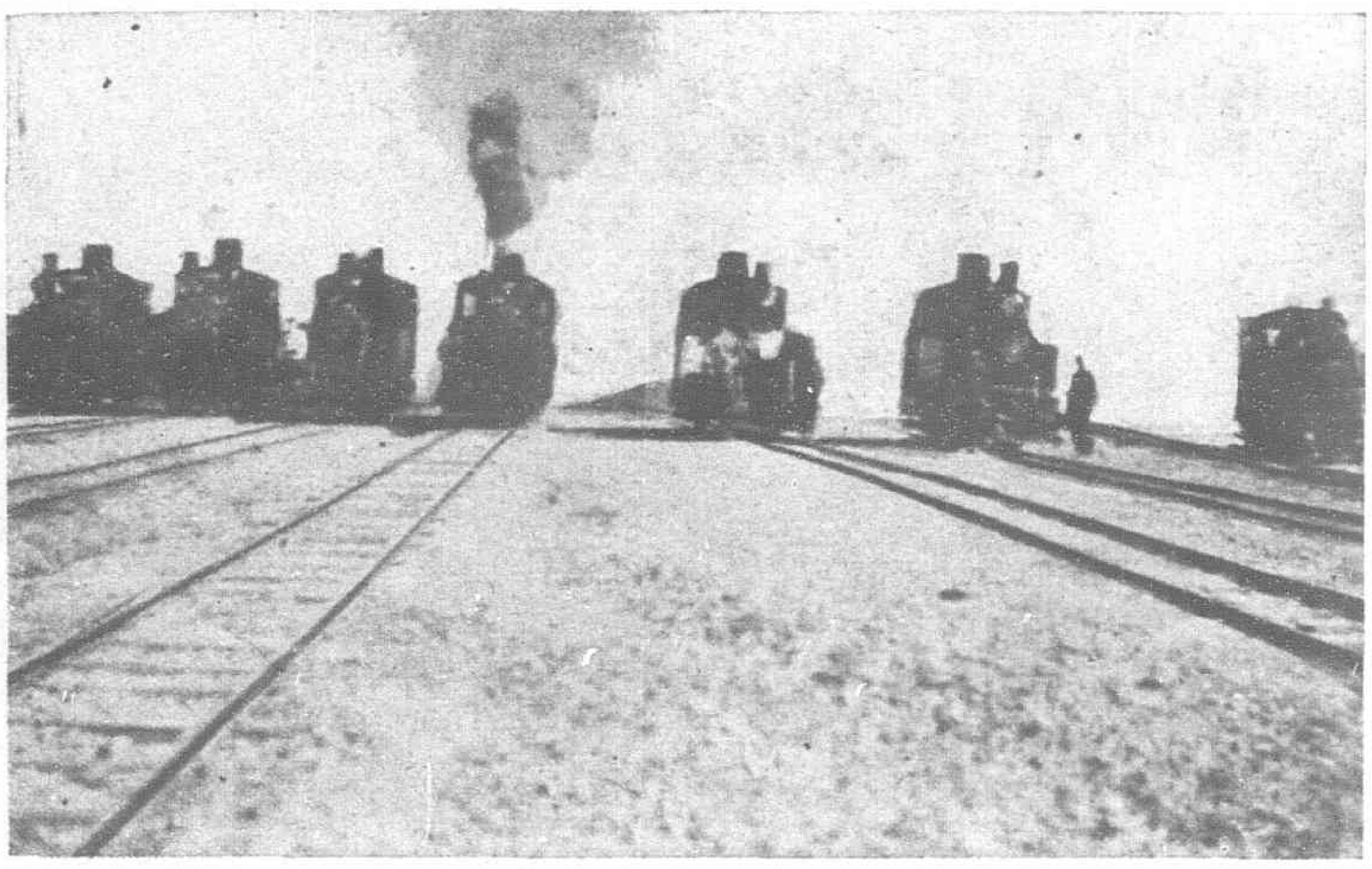
Water tanks along the right of way are built of wood. The water supply is derived from wells and the tanks are filled by a coolie, hand bucket system. During the severe winter weather considerable difficulty is experienced in preventing the water from freezing in the tanks.

The Tumen River Railway has constructed a temporary double track bridge of timber across the Tumen River between Komosanbon and Tumen River Siding on the Tientu Railway for the use of push cars in the transfer of cargo. The Chinese were much opposed to the building of this bridge and asked on several occasions for its removal, but an agreement has now been reached whereby a permanent structure will be built. This will insure through railway service from Tienbaushan and Lungchingtsun to Kwainei and will save a great deal of time and expense by avoiding the unloading and transferring of cargo at the bridge head. The Tumen River Railway stockholders are also interested in the Tientu Light Railway. These two lines are constructed to utilize the same type of cars and locomotives and built to the same gauge, therefore, their equipment is interchangeable and will facilitate the interchange of traffic.

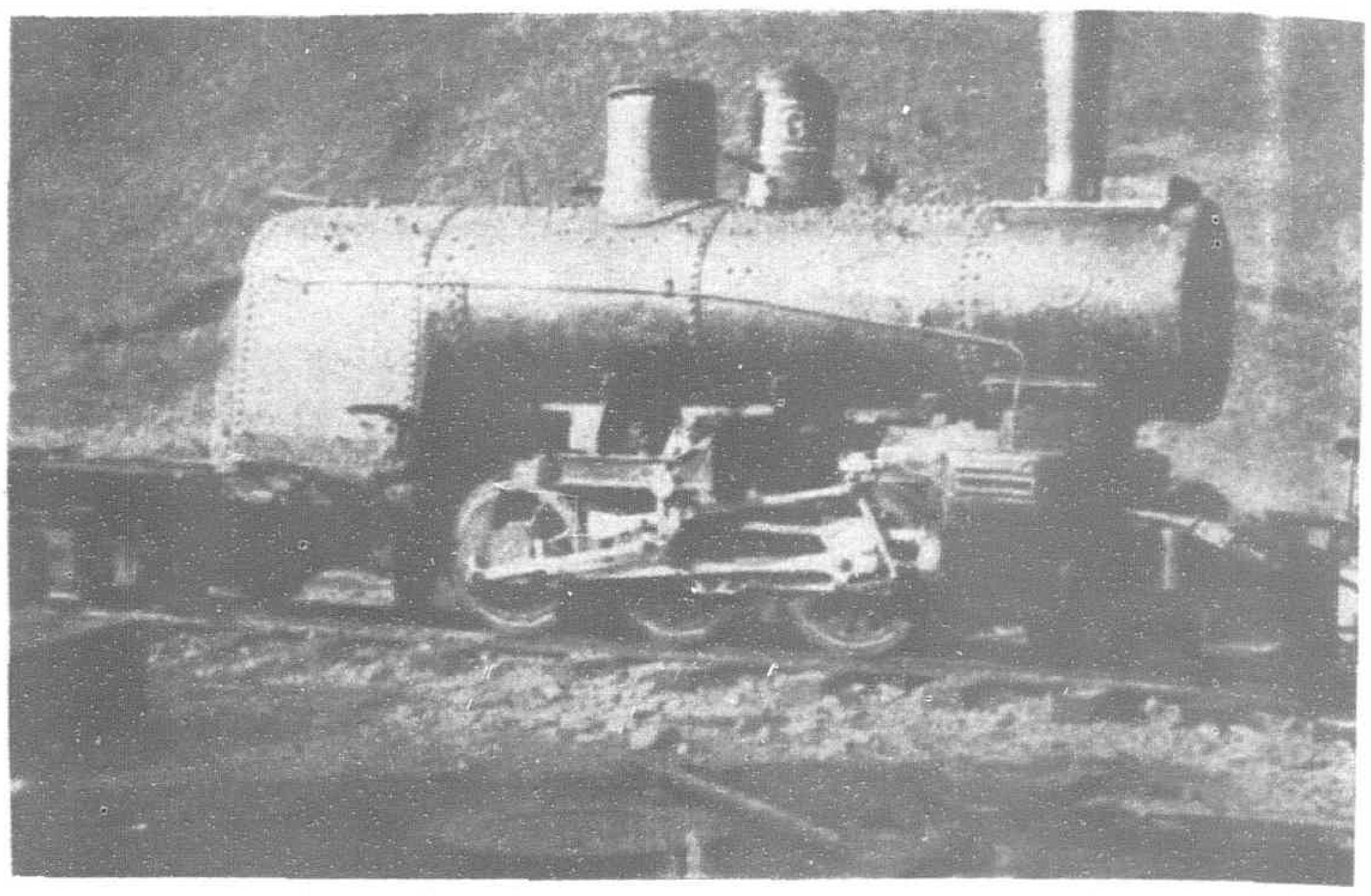
The section of country in which the Tientu Light Railway operates is practically under Japanese supervision and this includes the telegraph and telephone system, and prior to 1923 also included the post office. There are approximately 250,000 Koreans resident in this district. Lungchingtsan, the largest important town, has a population of 20,000 Koreans, 2,500 Chinese and 800 Japanese. It is the headquarters of the Japanese consular district as well as the Chinese customs. Lungchintsun is a progressive town with well laid out streets and good drainage facilities, and included among its buildings a Japanese hospital and many schools for Chinese, Japanese and Korean children. Among other important institutions the Bank of Chosen and the Canadian Presbyterian Mission are noteworthy. Agriculture is the sole industry, the principal exports at this time being soya beans, millet and wheat. The export of grain from this district in 1922 approximated 52,000 tons, transported by ox carts. In 1923 exportation had increased to 66,000 tons approximately, 33,000 tons handled by the new railway and the remainder by ox carts. The tonnage handled by rail represented its maximum capacity which was necessarily limited by the shortage in locomotives and cars.

A lignite coal mine, now in operation, is situated at Laotaokou. Upon completion of the railway to this town the coal supply will be utilized by the railway and by towns along the line. Coal will also be exported to Chosen inasmuch as the quality of coal in north Chosen is poor. At the present time the inhabitants of this district use twigs and dried weeds for fuel, as there is no available timber supply.

By reason of the extension of the main line and the anticipated increase in traffic, the Tientu Light Railway purchased from The Baldwin Locomotive Works, six 0-6-4 type, class 10-14 1/3D locomotives for passenger and freight service. These locomotives were designed with large fire-boxes to burn the grade of coal peculiar to the territory, and with hauling capacities sufficient to handle



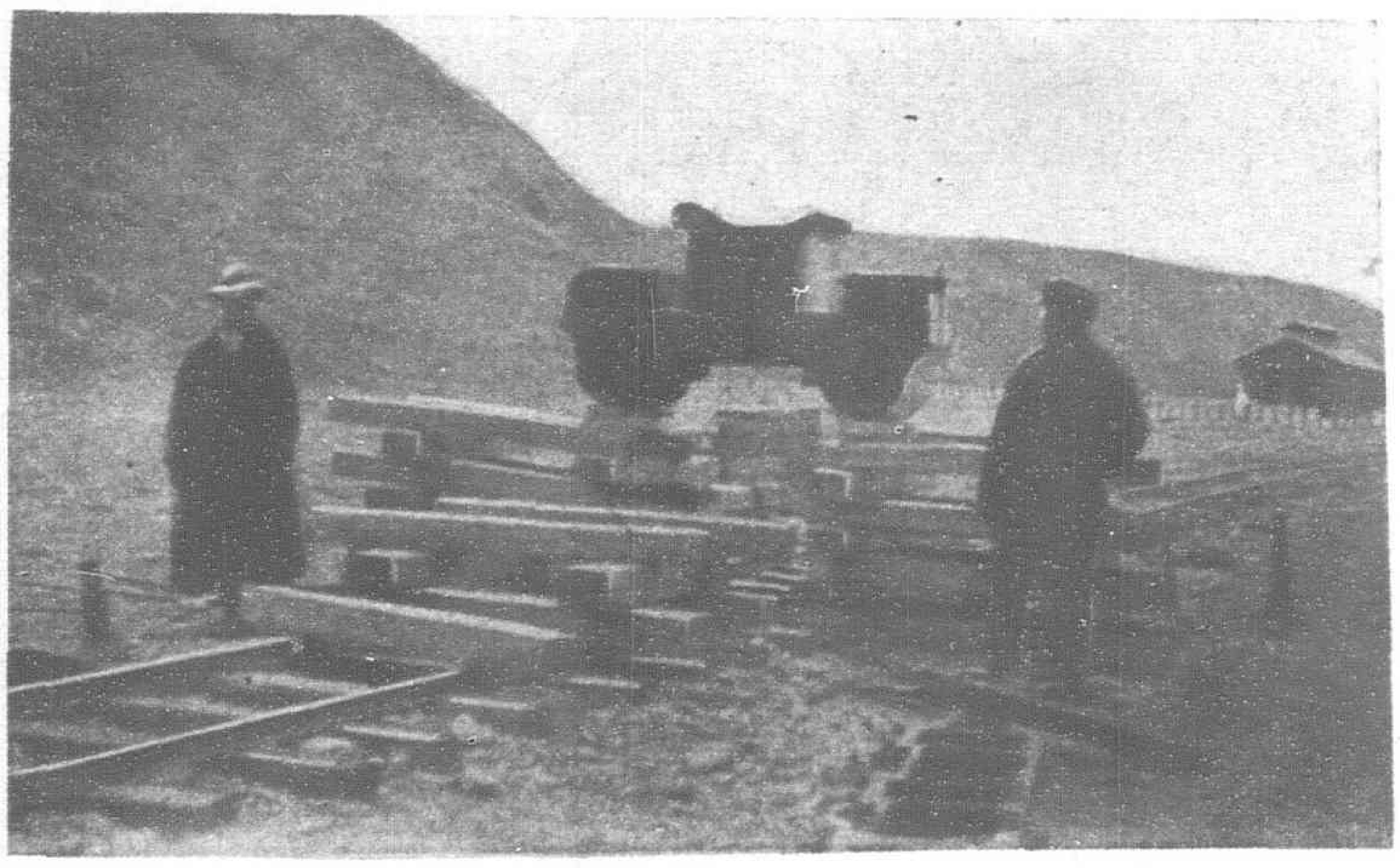
The Re-erected Baldwin Locomotives Under Steam



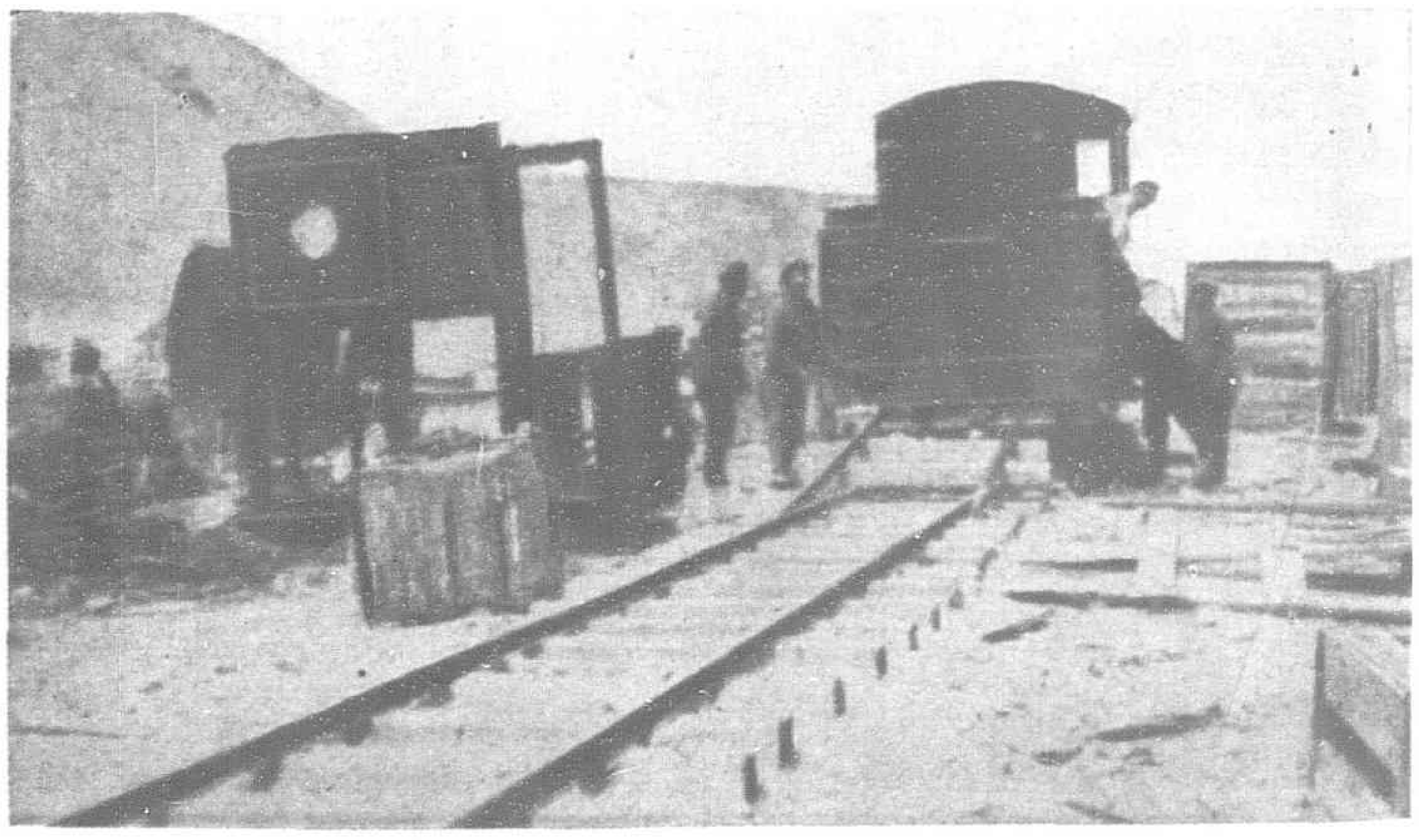
Bolier Bolted to Frames and Cylinders

trains of 90 tons over the heavy grades. The order was placed on September 22, 1923, completed at The Baldwin Locomotive Works November 29th, and delivered at Kobe on February 15, 1924. Unexpected delays at Kobe caused by the earthquake, prevented delivery to the railway at Tumen River Siding before April, 1924. The locomotives, however, were all re-erected by May 16th and were placed in service two weeks later. The Tientu Light Railway at the present time has eleven American-built locomotives, 1925 freight cars of five tons capacity, both box and gondola types, ten, four-axle flat cars, and approximately thirty passenger cars of the four-axle type.

It is planned to extend this railway to Kirin in the near future, but this is a political question for decision later. The prospects for extension are very encouraging and as the railway will collect a considerable amount of freight for transportation to the Chosen territory and the port of Seishin at the end of the South Manchurian Railway (Chosen lines), this line will eventually reduce the length of haul from North Manchuria to tidweater. At present the project calls for the opening of the country adjacent to the Chosen territory and the transportation of coal, ore and grain to the Japanese port of Seishin. It may therefore be expected that by the aid of modern transportation through a highly fertile country progress will be rapid, and the introduction of new capital into North Manchuria will necessitate the construction of the standard gauge line from Kirin to Kwainei, a step of extreme importance in the future development of China.



Cylinders Blocked Up to Facilitate Placing Wheels Under Frames



Sliding Water and Fuel Tanks Into Place

Indian Contracts

Of late a large number or more or less important contracts have been made for supplies for the Indian market, as well as many further tenders being called for. Vickers have supplied considerable quantities of pressed steel parts for rolling stock for several of the Indian Railways as well as many wheels and axles for the Great Indian Peninsula Railway; for the Bengal-Nagpur Railway a number of "all steel' wagons, and high sided and covered goods wagons for the Assam Railway. The South Indian Railway Company is calling tenders for 45 bogie steel covered wagons. The Bombay, Baroda and Central Railway Company is making enquiries for quantities of switchgear, rotary converter sets and transformers, and independence bonds for track circuiting. The South Indian Railway Company is calling tenders for steel covered goods wagons. Messrs. Beyer, Peacock & Co., of Manchester, are constructing two large "Garrett" locomotives for the Bengal-Nagpur Railway. These engines will be the most powerful locomotives operating in India. The Bedford Engineering Co., of Bedford, are making two large electric "Goliath" cranes, running on rails 60-ft. span for the Indian Stores Department. The British India Steam Navigation Company have placed another order for a 10,000-ton steamer with Hawthorn, Leslie & Co., of Wallsend-on-Tyne.

In India an expenditure of £2,000,000 has been ear-marked by the Madras and Southern Mahratta Railway for new locomotive and wagon building shops near Madras. The construction of the Raipur Partbartipur Chord Railway from the Central Province to a proposed new port near Vizagapatam is likely to make an early beginning, while a new line, 84 miles long, in the Barsi district, has been sanctioned by the Government, and the £500,000 capital required is about to be raised in London. The Nizam State Railways are to build huge railway works at Secunderabad to British designs. Electrical plant and equipment is to be purchased by a Burmese lighting company.

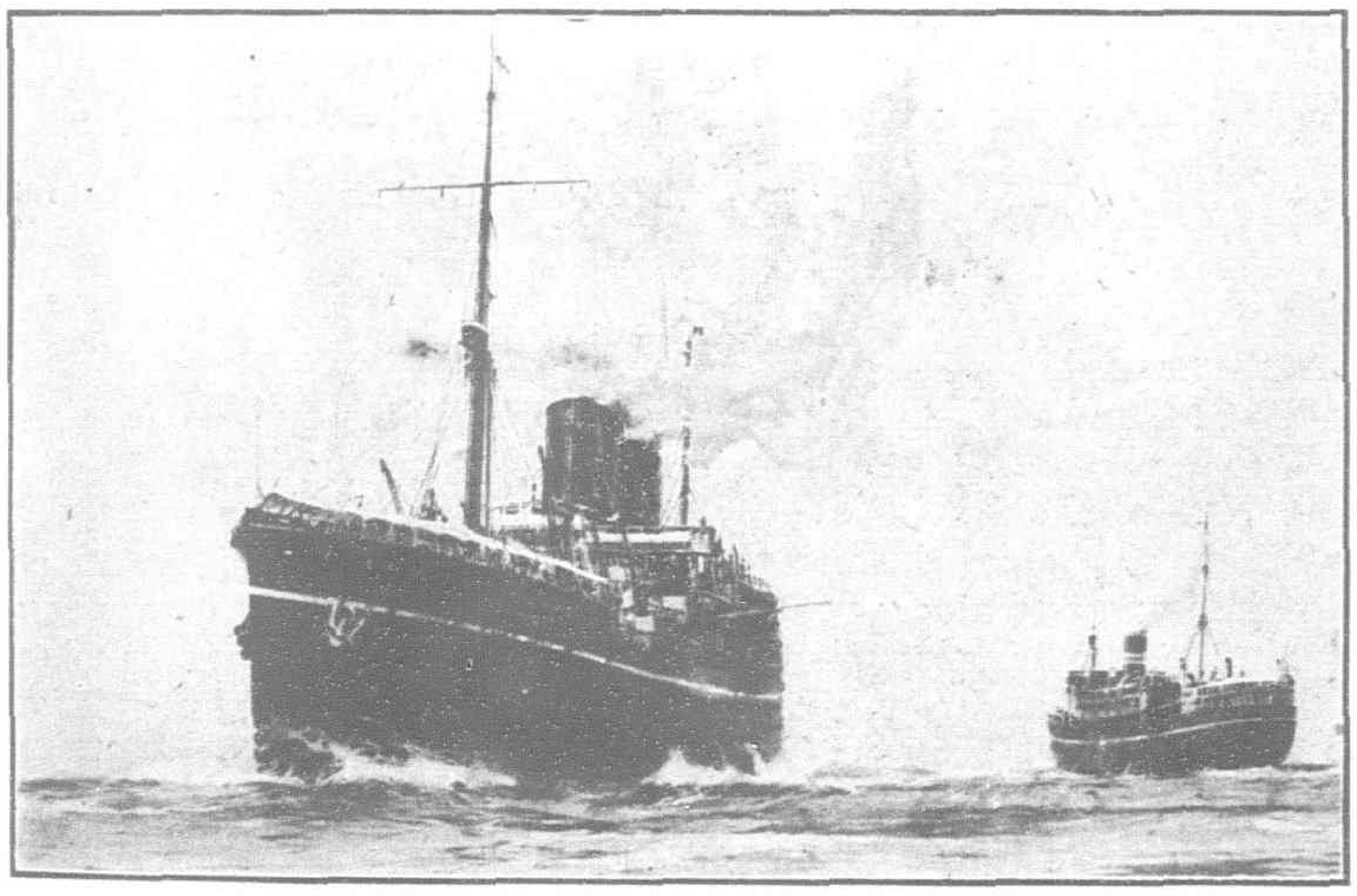
"Ranchi"—A New P. & O. Steamer

ON January 24, the *Ranchi* was launched by Lady Addis, wife of Sir Charles Stewart Addis, K.C.M.G., a director of the Peninsular and Oriental Steam Navigation Company.

The vessel has been built and engined by Messrs. R. and W. Hawthorn, Leslie & Co., Ltd., Hebburn-on-Tyne. Her dimensions are:—Length overall 570 feet, beam 71 feet 3 inches, depth 47 feet, tonnage gross, about 16,000, speed 17 knots.

The *Ranchi* is a handsomely modelled passenger and mail steamer with two funnels, is the second of two sister ships that are being built at Hebburn shipyard for the Peninsular and Oriental Steam Navigation Co., and will shortly take her place in the company's oriental service. She has seven decks in all, and is designed on the most up-to-date lines, particular attention having been directed to the comfort of passengers travelling in tropical climates.

The first saloon is to be decorated in a French style. The lounge, music room and smoke room are designed with high ceilings, skylights and large bay windows. The lounge itself is decorated in a "Georgian" style while the music room is to be finished after an "Adams" period room. The furniture in the various rooms will be reproductions of that found in rooms of the respective periods, as will also be the case with the tapestry. The smoke room, an old English "Tudor" design, will be one of the main features of the ship, finished in a "grey colour" oak, with the characteristic small square panels broken here and there by vertical oak and plaster strapwork seen so often in so many of the "old world" towns in England. The smoke room will open out on to a verandah.



New P. & O. Steamers

The cabin accommodation is particularly spacious and well lighted, each cabin having a portlight through the ship's side, and special arrangements are being made whereby each passenger will have a constant supply of fresh air available. The old ventilation fan system is entirely superseded. Passengers in bunk or during the day simply press a button to obtain a supply of fresh air, which immediately supplies every part of the vessel. A passenger lift is to be fitted between all the passenger decks on the ship, thus facilitating access to all the public rooms and passenger accommodation. A number of special cabins are situated on "B" deck, each having a separate bath room. Large promenade decks are arranged where passengers can sit in the shade, and special places are allocated for deck games. The ship is provided with two hospitals, dispensing rooms, and surgery.

The second saloon accommodation is designed on similar lines to the first saloon, with dining room, lounge and smoke room. These rooms are all tastefully panelled out, and the latter are fitted with large bay windows. The galleys and pantries, together with the bakeries, butcher's shop and sculleries, are situated between the first and second saloons, occupying a considerable space amidships and are fitted with every cooking appliance for the company's "a la carte" service.

The *Ranchi* has seven cargo holds, which are divided up into mail rooms, bullion rooms, insulated spaces and bulk cargo holds, and they are served by a most efficient installation of hydraulic cranes for the rapid handling of all cargoes. Two cranes are fitted to each hatch.

The propelling machinery, constructed at the St. Peter's works of the shipbuilders, is the most up-to-date type of reciprocating machinery, and comprises two sets of four-cylinder quadruple expansion engines, balanced on the Yarrow-Schlick and Tweedy system, having cylinders 32½, 46, 67 and 96 inches by stroke of 60 inches. The engines will develop about 15,000 i.h.p. and are fitted with Brown Bros., direct-acting hydraulic reversing engine, and turning engines of the two-cylinder two-crank type are fitted for each main engine. The main condensers of the "Unifex" type are fixed to the back columns of the engines. Auxiliary machinery of the latest up-to-date practice is fitted to ensure the best possible economy, efficiency, and reliability on the exacting service in which the vessel will be employed. Thrust blocks of the patent "Mitchell" type are fitted to the main shafting. The propellers are fitted with adjustable manganese bronze blades. The boilers are of the multitubular type, six in number, double-ended, constructed for a working pressure of 215 lbs., and are arranged for burning oil fuel on the "Clyde" system in conjunction with Howden's forced draught. The oil fuel burning installation is in duplicate, each unit being of sufficient capacity for working the machinery at full power.

The "Atago Maru" and the "Asuka Maru"

(*Continued from page 227.*)

200 b.h.p. engine with cylinders 310 mm. diameter and 420 mm. stroke. It may be remembered that the two-stroke motors of this type which we have described have been referred to as crank chamber compression machines. In the engines on the *Atago Maru* a normal vertical scavenging pump has been adopted, driven off the crankshaft, which we think is an improvement for this class of work. The only valve in the cylinder cover is for fuel admission and this is automatic, the timing being effected on the fuel pumps, so that there is no question as to the simplicity of the design. The governor is on the end of the crankshaft and the speed is regulated within close limits by a large handwheel altering the tension of the governor springs.

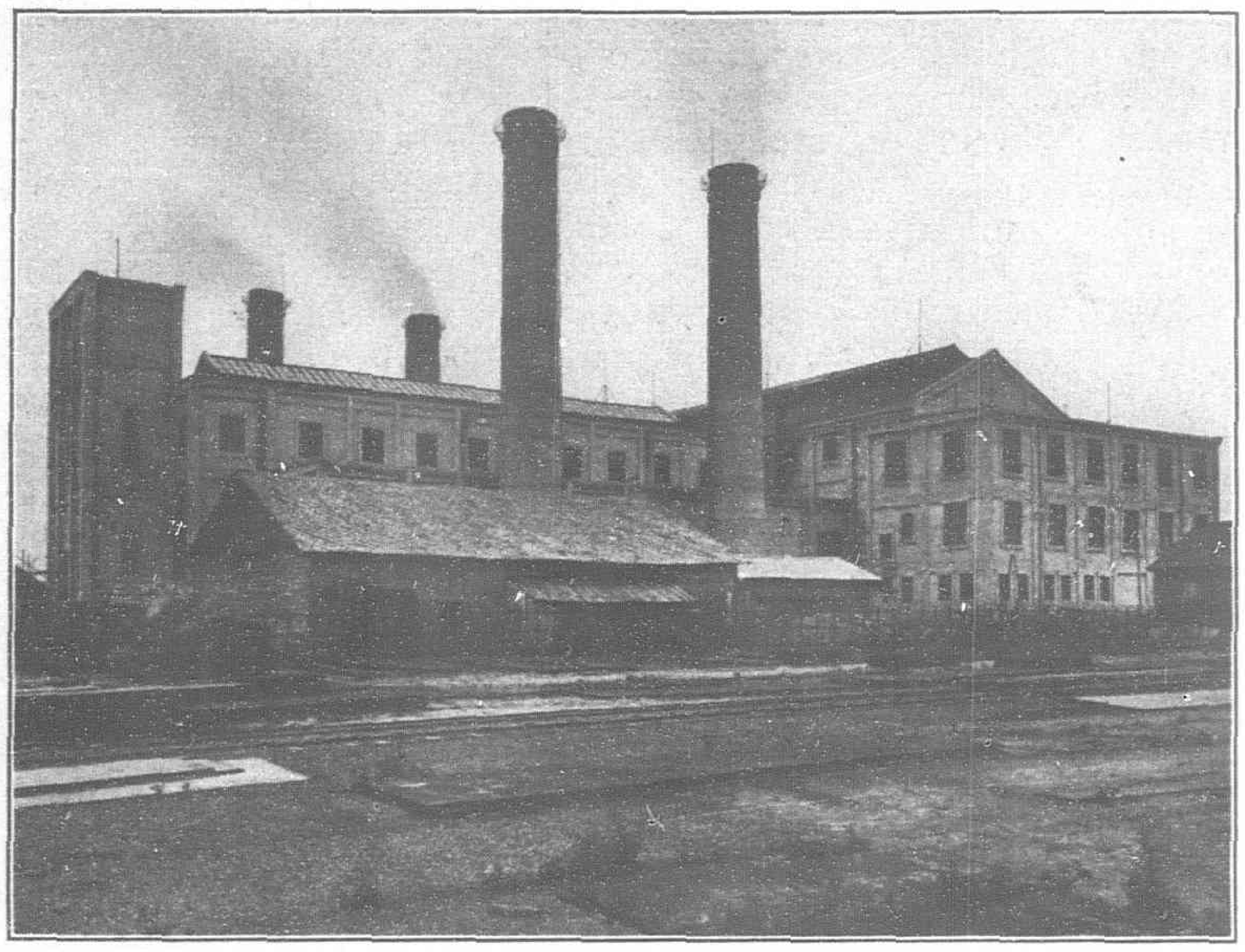
Two of these generating plants are on the port side of the engineroom and one to starboard, the two Sulzer air compressors being also on the port side. These work up to the maximum pressure of 1,000-lb. per sq. in. (in contrast with 360-lb. per sq. in. on the sister ship), but are relatively small, with an output of 105 cub. ft. per minute and driven by an electric motor of 50 b.h.p. A small steam-driven emergency air compressor is provided for use in the case of complete loss of air.

Sea-water is used for cooling the pistons as well as the cylinders of the main engines, but the pumps for the two services are separate. For the former are two rotary pumps of 30 tons hourly capacity working at 60-lb. per sq. in., driven by 8-9 b.h.p. motors, whilst for cylinder cooling (for auxiliary as well as main engines) there are two 100-ton low-pressure centrifugal pumps coupled to 22 b.h.p. motors. In each case one pump is a standby.

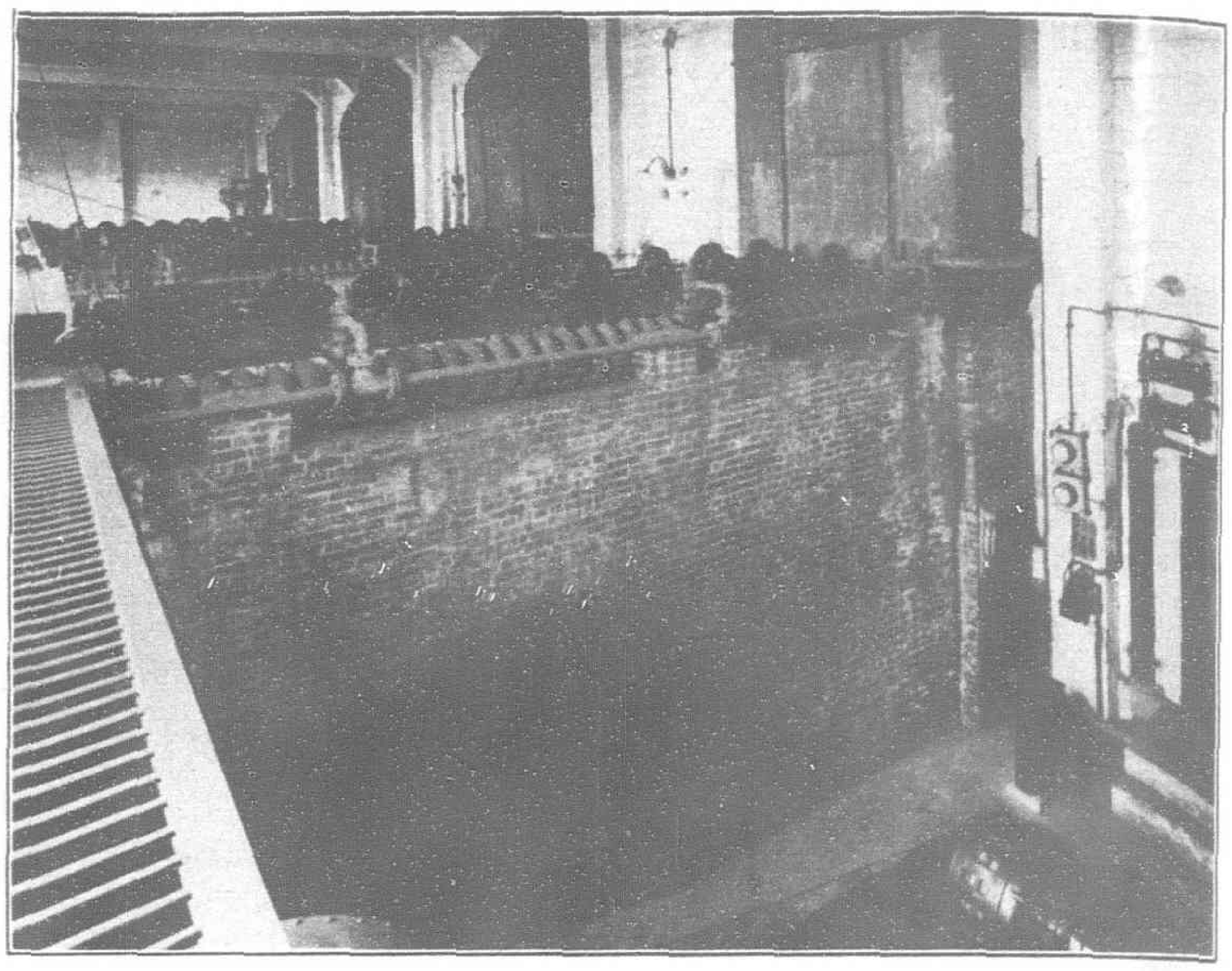
A 200-ton Drysdale Centrex ballast pump is provided, and a similar pump for cargo oil, whilst the motor is of 30 b.h.p. A 30-ton Drysdale upright type fire pump is fitted, also a Vickcen centrifugal separator and a fuel oil transfer pump. There are no independent lubricating oil pumps, apart from one compressed-air driven installation, which may be looked upon as an emergency set. A small steam-driven compressor, with a capacity of 15 cub. ft. of free air per minute, for use in case of complete loss of air, a Cochran donkey boiler, a 30 h.p. Sulzer airless injection engine coupled to a dynamo and a 50-ton upright Drysdale sanitary pump complete the engine-room auxiliary equipment.

The two fuel oil settling tanks are of about the same capacity as those in the *Asuka Maru*, being some 8-ft. in diameter and 10-ft. in height. The thrust blocks, which are incorporated in an extension of the bed plates, are of Sulzer's single-collar type designed for a pressure of 85-lb. per sq. in. In the *Asuka Maru* thrusts of the Michell type are used.

It will be gathered from this description that the two ships are in every respect vessels of the most modern type, and if the owners are willing to furnish some details of the comparative results obtained after being in service for a year or two, the figures would be of the greatest interest and value. In any case, the enterprise they have shown in investigating the relative advantages of two and four-stroke machinery is worthy of all commendation.



General View of Power House



Fuel Economizers

The Ujigawa Electric Power Company

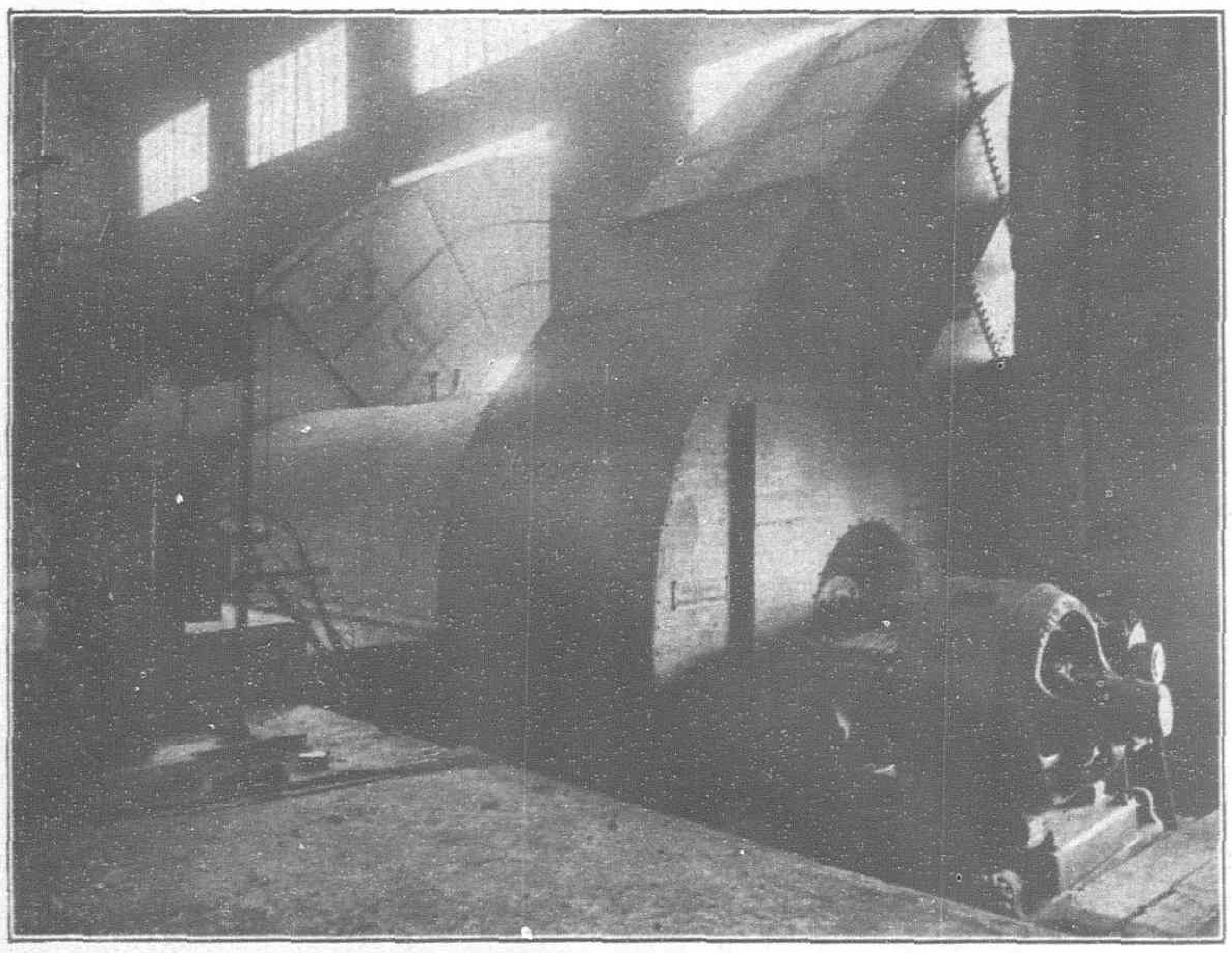
ONE of the great Japanese corporations which recently successfully negotiated a loan in the United States is the Ujigawa Electric Power Company, one of the largest hydro-electric Companies in Japan.

The Ujigawa Denki K.K. of Osaka was incorporated October 25, 1906 (the 39th year of Moji) with a capital of Y. 12,500,000 and represented the amalgamation of four other Companies.

Under the very able management of the President and Directors, the Company has expanded and increased to take care of their consumers of electric light and power until at present the capital stands at a grand total of Y. 85,000,000.

Mr. Yasushige Hayshi, the President, Mr. Sensaburo Kageyama, Managing Director and Messrs. Matazo Asami, Son, Noguchi, Juntaro Yamaoka, Zenpei Mayekawa, Senzo Nagai, Tetsu Kobayashi and Senji Sakamoto constitute the Board of Directors.

The ownership of stock is very widely spread and represents the ideal of successful public utility ownership as can be judged from the fact that 7,150 shareholders were represented at the last general corporation meeting.



Induced Draft Fans

The territory served by the Ujigawa Electric Power Company, Limited, directly or through municipal or other distributors, is in central Japan, has 188 cities, towns and villages, and includes three of Japan's largest and most important cities: Osaka, the largest manufacturing city in Japan, with a population of over 1,425,000, and with Tokyo, the capital, one of the two largest cities in Japan; Kobe, the largest port city, with a population of 724,000; and Kyoto, the former capital, with a population of 680,000. It includes the chief industrial district in Japan, manufacturing textiles, iron and steel products, chemicals, copper and copper wire products, machinery, electrical equipment, fertilizers, lumber, rubber, paper and a variety of other products. Total population of the territory served is over 7,000,000.

The Ujigawa Denki K.K. owns hydro-electric plant capacity of 72,367 k.w., steam plant capacity of 40,000 k.w. and in addition, purchases power up to a capacity of 55,400 k.w.

Their principal power and light market is in and around the fast developing city of Osaka and to the near by city of Kobe.

Osaka is supplied with an average of 8,000 k.w. per hour in daytime and 24,000 k.w. per hour during the evening lighting period. A constant load of 5,000 k.w. per hour is supplied to the Kyoto Dento K., of 4,000 k.w. per hour to Kobe and a scattered load of an additional 4,000 k.w. per hour about the city of Kobe.

In the Osaka district, the Company has 33 miles of underground wire and 2,343 miles of pole line wire, including the district between Osaka and Kobe.

The following figures illustrate the universal use of electricity in the district, even to the humblest dwelling, and the use of *power among the small industries in Japan.*

In the Omi Branch of the Company, there are 181,833 connected lights among 92,491 consumers and 5,504 horse-power among 1,219 consumers. This district has 3,679 miles of wire.

At the Yamato Branch, there are 82.615 connected lights among 32,623 consumers and 10,202 horse-power among 391 consumers. In this branch there are 3,133 miles of wire.

Kumano Branch has 42,084 connected lights with 19,548 consumers, 1 466 horse-power among 121 consumers and 694 miles of wire.

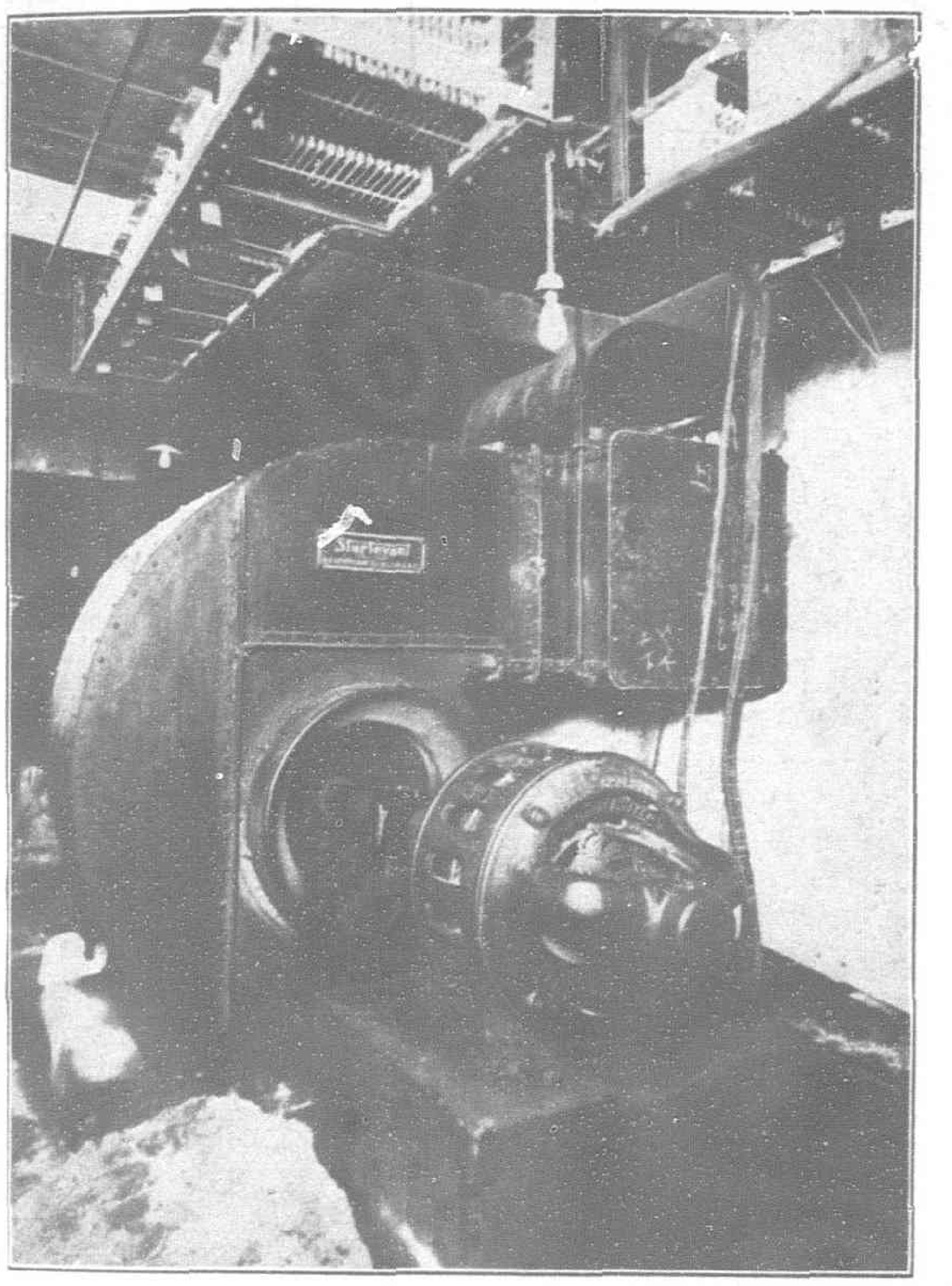
The very modern Fukusaki steam power-house of the Company is located at Fukusaki, Nichi-ku, a suburb of Osaka. The first installation of apparatus at this station was made in 1920 (the 9th year of Taisho) with a total generating capacity of 30,000 k.w.

The design and construction of the station was carried out by Wadachi Kobayashi, Chief Engineer, Tomoo Yabe, Engineer in Charge, with Kozo Sengoku, the Engineer of the Operating Staff.

The Plant is located on the river for condensing and boiler feed water and for bringing in coal and supplies.

All buildings are of re-enforced concrete laid out in unit system and so designed that future extensions are esaily made. In fact, a fourth steam unit with steam generating equipment was installed in May, 1923 (the 12th year of Taisho) bringing the present capacity up to 40,000 k.w.

The operation of the Plant has been most successful. Coal is burned on rilly underfeed stokers and as the forced draft and furnaces were all properly designed for the work, a very high rate of combustion and overall efficiency is maintained.



"Turbovane" Stoker Forced Draft Fans

The stoker forced draft consists of B.F. Sturtevant Company turbovane fans direct connected to 1,750 r.p.m. wound rotor induction motors. The induced draft fans are sturtevant multivane type of heavy construction and wheel overhung on shaft supported by two ring oiled water cooled bearings. The induced draft fans are silent chain driven by wound rotor induction motors.

There are installed ten Erie City Iron Works Vertical Type No. 7-S water tube boilers, each having a nominal rating of 711 horse-power. The boilers are equipped with superheaters and each boiler has an individual economizer. The economizers were built by B. F. Sturtevant Company and consist of 36 vertical sections, eleven pipes wide with 9-in. pipes.

The 10,000 k.w. turbo Alternator Units were built by Westinghouse Electric & Manufacturing Co., and the Turbines are their well-known single flow, reactive type. The same Company built the Leblanc type condensers.

The steam generating equipment, stokers and draft was supplied by the American Trading Company, Inc., and the main electrical generating equipment by Takata & Company.

Gross earnings of the Company, including other income, and net earnings after depreciation, applicable to interest, and sales in kilowatt hours, for the five years ended September 30, 1924, were:

Years Ending Sept. 30		Gross Earnings	Net Earnings Applicable to Interest	Times Interest on Present Mortgage Debt	Sales in kilowatt hours
1920	..	$4,418,969	$1,463,575	1.5	295,000,000
1921	..	5,045,386	1,898,309	1.9	337,000,000
1922	..	5,884,253	2,497,103	2.5	430,000,000
1923	..	6,766,364	3,079,143	3.1	457,000,000
1924	..	7,673,607	3,176,581	3.2	543,000,000

Average net earnings applicable to interest, for the five years ended September 30, 1924, were $2,422,942, or more than 2.4 times the $980,000 interest requirement on these Bonds, which constitute the Company's only present mortgage debt, and in each of the last two years net earnings were more than three times this requirement. Net earnings of $3,176,581 for the year ended September 30, 1924 were more than 3.2 times the interest requirement on these Bonds and more than twice interest on total present funded debt, including the debentures. Other income, included in gross earnings, amounted to less than 4.7% of total gross earnings for the year ended Setpember 30, 1924.

In addition to its properties and plants, the Ujigawa Electric Power Company, Limited, has substantial holdings in stocks of controlled and affiliated companies, including the Osaka Electric Machinery Works, Ltd., and Osaka Porcelain Company, manufacturing electrical machinery and insulating articles; the Nippon Electric Heating Apparatus Manufacturing Company; the Kawasaki Electric Lamp Works; the Osaka Electric Railway Company; (owing and operating interurban electric railway between Osaka and Nara); and the following affiliated electric power companies: Imazu Generating Company, 26,600 h.p. total generating capacity; Ibigawa Electric Compony, 23,000 h.p. total generating capacity; and Nippon Electric Power Company, 84,500 h.p. total generating capacity.

Machinery Market in China

THE rather unsatisfactory decrease which took place in the imports of machinery into Shanghai during last year, especially as this branch of the import trade was regarded as being the most likely to expand, calls for some explanation, and in the recently published annual trade returns for the port the position is dealt with in detail. It appears that during the year business has mainly consisted in the settling up of old contracts—*i.e.*, completing deliveries, and in trying to obtain overdue payments for large orders placed in previous years. While there has been a regular business in supplies of various kinds, there have been comparatively few large contracts for new enterprises, most of the machinery sold being required for extensions to existing plants and factories. The railway business in 1923 was very small. Owing to financial difficulties most of the railway companies have found it impossible to agree to the very stringent terms of payment insisted upon by merchants, and have had, therefore, to restrict their purchases to a minimum. No contracts of any importance were made in Shanghai during the year for locomotives or other rolling-stock, and whatever small orders were placed appear to have gone to Continental manufacturers, whose quotations have been as much as 40 per cent. under American and 20 per cent. under British prices. It would appear, however, that, on the whole, railways have allowed their stocks to run down very low, and that it will be necessary within the next few years for most of them to replenish not only their general supplies, but also their rolling-stock. Next to the railways the textile industries have, in late years, absorbed a great deal of the machinery imported into Shanghai, foremost among them cotton mills, a large number of which have either been installed or enlarged in recent times. But during last year the cotton mill industry suffered serious reverses, and by the end of December it was reported to be in a worse position than at any other time in the last ten years. It was, therefore, not surprising that the business in new textile machinery should have been practically nil. What little business there was went largely to American manufacturers, who have been willing to meet British competition—in some cases 30 to 40 per cent. lower than American domestic prices—in order to keep their hold on the market. As for other industrial machinery, there have been contracts for cement works, match-making plants, can-making plants, and especially flour mills, an industry which is showing unmistakable signs of expansion. A very big business has been reported in electric-light machinery, and there has been considerable development in the heating and plumbing business, which, with the continuous building of small but up-to-date residences, shows every sign of further development. The radiator business alone is reported to have increased from 34,000-ft. of radiation sold in 1921 to 90,000-ft. in 1922 and 137,000-ft. in 1923, with considerable orders for the present year. One of the most noticeable features of the machinery business during the year was the disappearance from the trade of a large number of foreign firms which, during the boom period, had added machinery departments to their business. These firms have found that to sell machinery on the same basis as they were selling other goods is not feasible in a country where, owing to lack of knowledge on the part of buyers, engineering firms have to employ a very large technical staff, not only to advise the buyer as to what kind of machinery is needed, but also to supervise its installation and, to a certain extent, its satisfactory operation.

Worthington Locomotive Feed Water Heater Awarded Medal

ANNOUNCEMENT has been made that the Franklin Institute of Philadelphia, U. S. A. has awarded a special medal to Mr. Thos. C. McBride a prominent member of the Worthington engineering staff, in recognition of his inventions connected with the famous Worthington feed water heater and feed pump for use on locomotive.

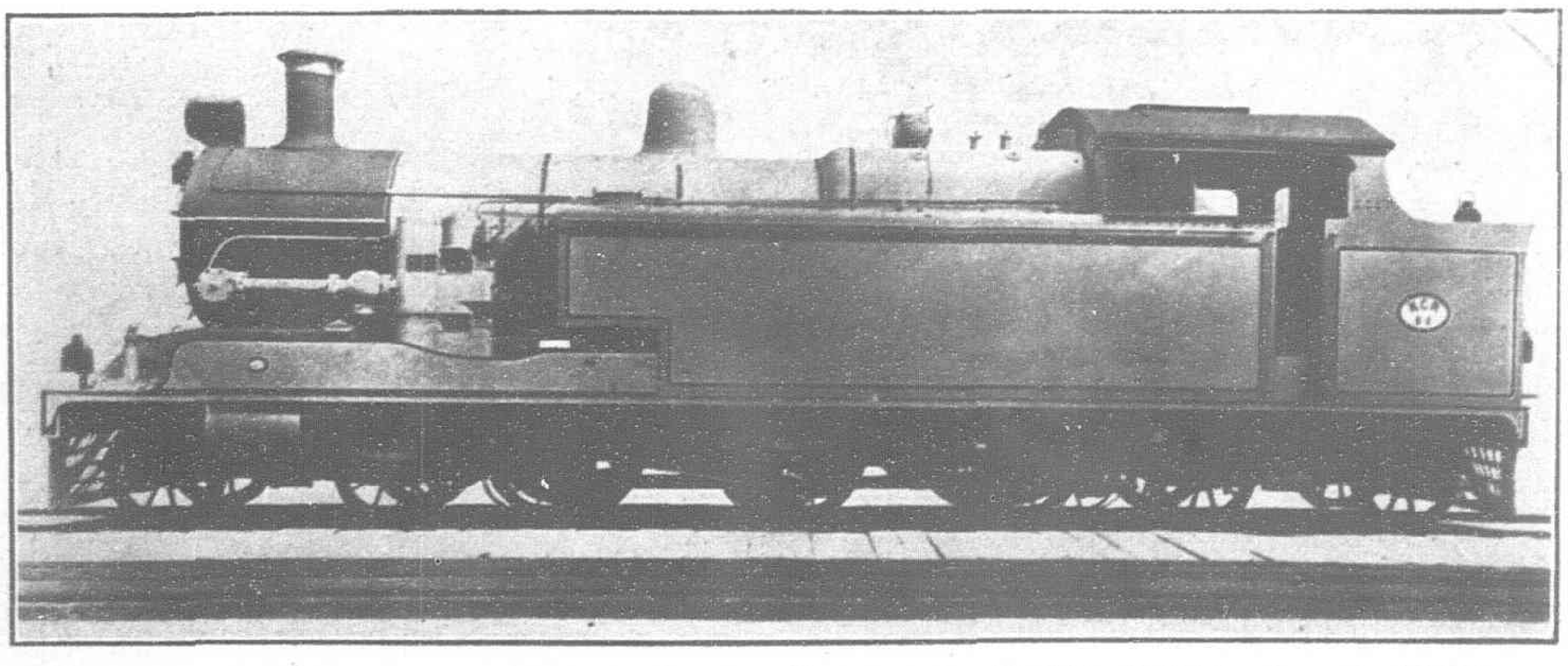
Mr. McBride has been one of the Worthington organization for nearly thirty years and is Manager of the Department in charge of this particular apparatus. He is a native of Philadelphia and a graduate of the University of Pennsylvania, with the degree of M. E. He is a past president of the Engineers Club of Philadelphia and is also a member of the American Society of Mechanical Engineers of New York, the Manufacturers Club and the Franklin Institute of Philadelphia.

Thomas C. McBride, the Worthington Inventor

The medal of the Franklin Institute is one that is very highly prized among American Engineers and is awarded only for inventions of high order and for particularly meritorious improvements and developments in machines and mechanical processes.

The basic principles of the Worthington locomotive feed water heater were evolved by Mr. McBride in 1915, and the manufacture of this apparatus had its beginnings in 1917. Its development into the present design has been a steady progression since then. So remarkable have been the results obtained in the use of saem that in this short time its reputation has taken on an international scope.

In making the above reference to the evolution of this heater under the sponsorship of Mr. McBride, with the great savings in fuel and water made possible thereby, it might be of interest to mention another outstanding benefit that locomotive owners have derived from its use. One of the most expensive and annoying troubles encountered in the operation of locomotives is pitting and corrosion of the boiler tubes. A major cause of this that has prevailed generally everywhere, has been found to be the production of electric currents between adjacent points on tube surfaces that are in contact with water. These currents are present even where there exists only a slight difference in the composition of the metal at those points. The flow of these currents releases what are known as "hydrogen ions," which carry off into solution with the water tiny particles of iron. A peculiarity of this action is that the water can absorb only an infinitesimally small quantity of these ionized particles, so that the solution quickly reaches a saturated condition, the electric currents become neutralized and further action ceases. By allowing air to enter with fresh feed water, the oxygen contained in the air immediately attacks and oxidizes the iron in solution, and this starts the cycles of activity all over again. It has been conclusively proven that these continue so long as air is admitted into the water space of the boiler.



Hongkong Railway, Canton-Kowloon Section, Locomotive K.C.R., B.S. Equipped with Worthington No. 2B Locomotive Boiler Feed Pump and Feed Water Heater (Heater Blake Built)

In designing the Worthington Heater this important matter was given careful consideration, and means were provided whereby more than 85 per cent. of the air that is normally in solution with all raw water is entirely separated and does not enter the boiler. As all of the exhaust steam used to heat the water in the Worthington open heater goes directly into the water fed to the boiler, the percentage of air present is thus further reduced to probably not more than 10 per cent. of that present in the feed water delivered by any other type of heater or injector.

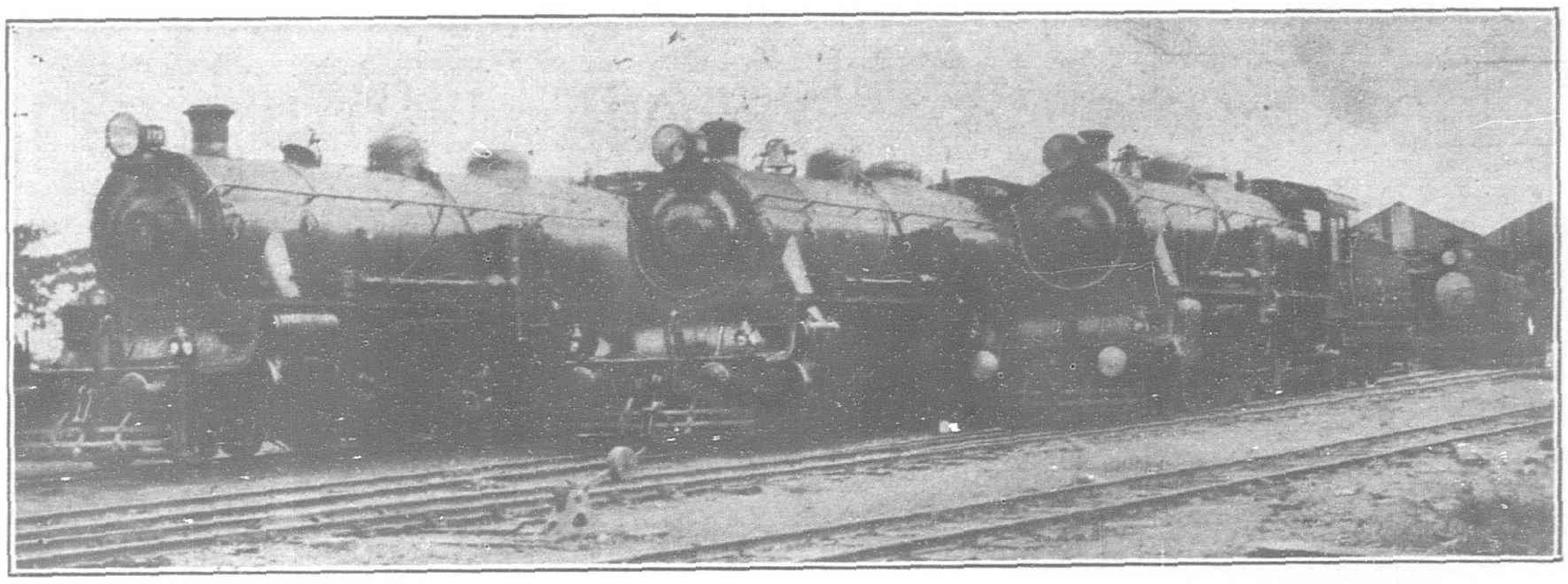
In discussing this subject an experienced American engineer who for several years has made a close study of these conditions, states as follows :—

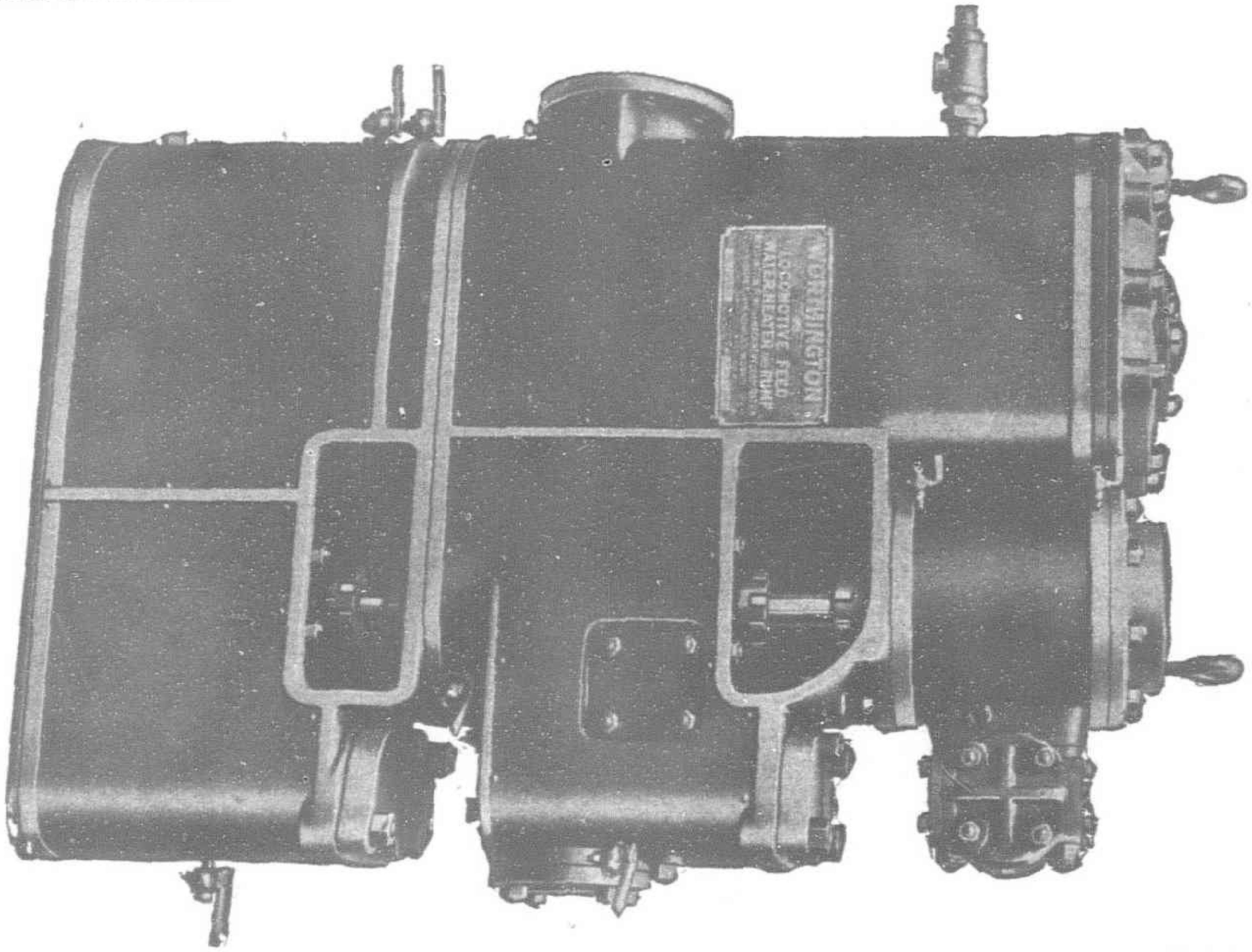
"The proof is complete when we find that the presence of an open feed water heater which nearly eliminates oxygen is sufficient to practically stop pitting in stationary boilers. Feed water heaters for locomotives are new in the world, but they are in successful use, and some of them are of the open type, so that the oxygen can escape while the water is being heated."

A number of mechanical and electrical devices and methods of water treatment have been tried out in an effort to counter-act this oxidation by the air taken in with the feed water, but all these have proven bothersome and expensive to install and to maintain. It has been found that the most practical method is to prevent the air from entering the boiler with the feed water in the first place. This the Worthington open locomotive feed water heater does automatically with no cost or bother either for extra equipment or for maintenance.

For many years Worthington had been manufacturers of closed feed water heaters for stationary service. In power plants where the heating of feed water was practiced the closed heater was in universal use. To-day but few of these can be found in use anywhere and concerns who made them have either gone out of business or have ceased their manufacture. Worthington was among the first to bring out a stationary heater of the open type.

It was the consideration of the above circumstances, among others, that induced Worthington engineers when designing the Worthington locomotive feed water heater, to discard the closed type and to adopt the open type of construction exclusively. The immediate recognition by railway engineers of the possibilities possessed by the open type of heater for locomotive work has been fully justified by the wonderful results that have been realized wherever these Worthington heaters have been installed.


Manila Railways Company Locomotives Nos. 173, 206 and 175 Equipped with Worthington Locomotive Feed Water Heater and Pump of 32,500 lbs. per Hour (65 gals. per min.) Capacity Photo Taken at Manila, P. I.



The Worthington Heater

The rapidity with which the use of the Worthington open Heater has spread all over the world, and the fact that already thousands have been adopted by the most important railway system in all the principal countries of Europe, Asia, South America and South Africa, as well as on practically all the larger railways in the United States, Canada and Mexico, as standard and indispensable units of locomotive equipment, are marked tributes not only to the genius of the inventor who is the subject of this article, but they are also conclusive proof of the many exceptional merits of excellence that are inherent in this apparatus.

Bristol Ports Abolish Far East Freight Surcharge

The abolition of surcharge from Newport and Swansea to Far Eastern Ports has been officially notified by the Secretary of the South Wales and Monmouthshire Iron and Steel Manufacturers Association as from February 1, as a result of negotiations conducted by a committee representing the employers' associations of the South Wales iron and steel and tinplates trades and Chambers of Commerce, in association with the Great Western Railway.

It is considered that as nearly one-half of the total iron and steel exports from Great Britain to the Far East are dealt with at Bristol Channel ports, the concession will be one of prime importance to South Wales manufacturers in one of their foremost markets. The South Wales manufacturers have hitherto had to pay a surcharge of 5s. ($1.25 U.S.) on traffic loaded at the ports named or incur the expense of heavy railway carriage to the River Mersey. Freights from Newport and Swansea to the principal markets are now on the same basis as London, Liverpool, Glasgow, and Middlesbrough.

Largest Turbines for Export Ordered by Japan

Two 43,750 kv-a., 50,000 shaft horse-power, steam turbine generators, the largest complete units ever built for export, have been ordered by the Hayakawa Electric Power Co., of Japan from the International General Electric Company, U.S.A. The installation, to be made at a cost of approximately two million dollars, will be used in parallel with the hydro-electric developments of the company in the hamamatsu district for furnishing power to Tokyo. The average consumption of electricity in Japan for the lighting of homes is about 35 watts; these huge generators are capable, therefore, of lighting about two million homes. It is in the rapidly developing industrial field, however, that the major part of the power will be used.

The size of the turbines can be appreciated from the fact that the rotors weigh 60 tons each, and are 30-ft. long and four feet in diameter. Each turbine has a net weight of 785,000 pounds. Except for the rotors, the apparatus will be shipped disassembled, making the journey from Schenectady *via* the Panama Canal. Shipment of the first unit will be made this summer. The second unit will be shipped early in 1926.

The turbines will produce energy at a 11,000 volts and 50 cycles. The order also includes two 1,000 kw., 3,300 volt, 50 cycle house turbines. The equipment is to be installed in a new power station the Hayakawa Co. is building at Kawasaki, to the south of Tokyo.

The order for the equipment was received by the Tokyo office of the International General Electric Company through Mitsui and Company. The Hayakawa Electric Power Company is a subsidiary of the Toho Electric Power Company, which in turn has a controlling interest in the Daido Electric Power Company, one of the most important power amalgamations in Japan.

A year ago, the Toho company ordered from the International General Electric Company a similar turbine, but rated at 60 cycles rather than 50, for installation in Nagoya, in the south of Japan. That order established the record for export turbines, but has been surpassed in physical dimensions by the new order.

Another order received recently from Japan by the International General Electric Company from Mitsui & Company is for three vertical water-wheel driven generators, the order having been placed for the Gifu Electric Company. The generators are rated at 10,125 kv-a., 6,600 volts, and will have direct connected exciters. The order also includes a two unit, three bearing, motor generator set, seven 5,000 kv-a., 60 cycle, water-cooled transformers, and a 17-pannel switchboard.

The Soya Bean in Manchuria

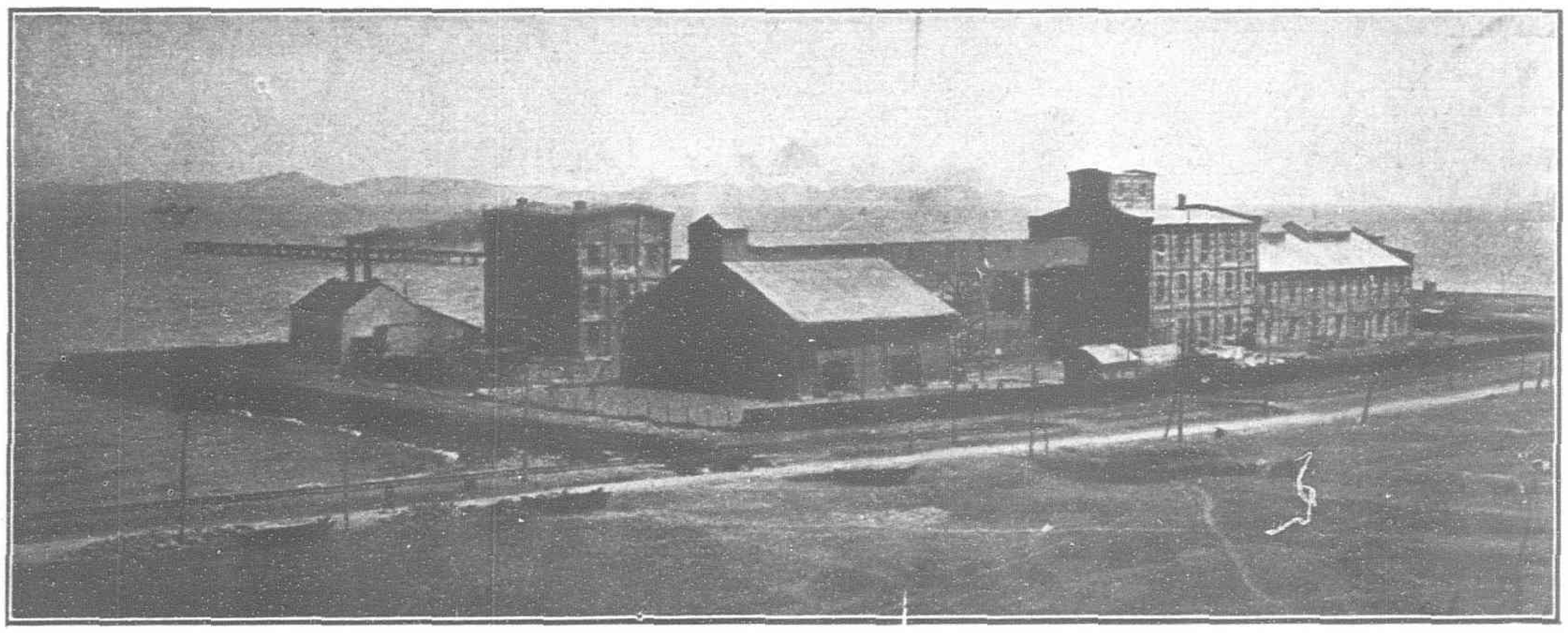
By Taro Ito of the Manchuria Railways Co.

A Paper Read at the Pan-Pacific Food Conservation Conference

As all of you know, the soya bean has constituted an important foodstuff in China for the past 5,000 years. China boasts of the foremost position of the present-day world in the production of soya beans. Eighty per cent. of the world production is cropped in China at the present time and 70 per cent. of China's yield is produced in Manchuria.

Manchuria, therefore, ranks first in so far as soya bean production is concerned. Her annual yield is estimated at approximately 3,500,000 kilolitres.

These large figures are results brought about by the rapid development of recent years and this development is in turn due to the effort on the part of the Manchurian farmers as well as activities on the part of railroad authorities. Although the soya bean of Manchuria has now risen to the place of a world commodity, yet it was not until 1908 that Manchuria soya beans were introduced to the world market. In that year the first shipment was made to England; and ever since that time their utility has come to be recognized by European and American people, and they are annually exported either in the shape of oil and cakes or in the shape of beans. The soya bean has attained the position of being the most important agricultural product in Manchuria to-day, and it is by no means exaggeration to say that business circles depend to the greatest extent upon the market situation of this commodity.



South Manchuria Railway's Experimented Bean Mill

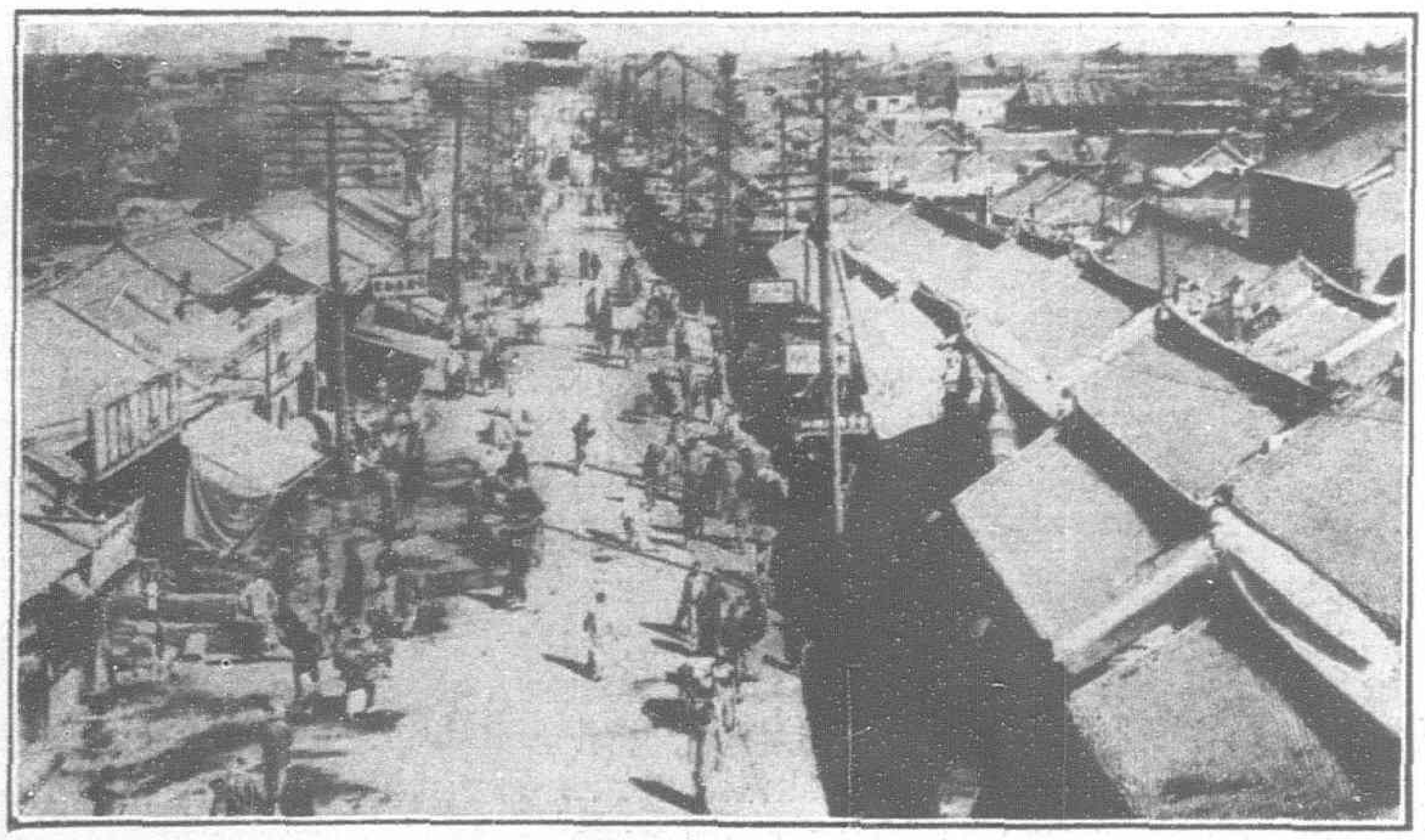
However, the Manchurian beans are not so important as such, as they are as the raw material for oil and bean-cake. The greater proportion of the soya-bean crop is consumed in oil factories for the manufacturing of oil and cake, while a lesser proportion is exported to China proper, Japan and other foreign countries, such as England, Germany, Holland and Egypt on the one hand, and America on the other.

The quantities of soya beans carried by the South Manchuria Railway alone amounted to 2,000,000 metric tons for the year 1923. Of this tonnage 400,000 tons were exported to Japan, 150,000 tons to China proper, 80,000 tons to the South Sea Islands and Australia and 1,000 tons to America, chiefly to the port of Seattle, in the Pacific area, and 120,000 tons to Europe and Africa. The aggregate of exports amounts to 750,000 metric tons for the last year. That is, something like 37 per cent. of the beans which entered into the railroad traffic were shipped by steamers from Dairen, the southern terminal of the railorad.

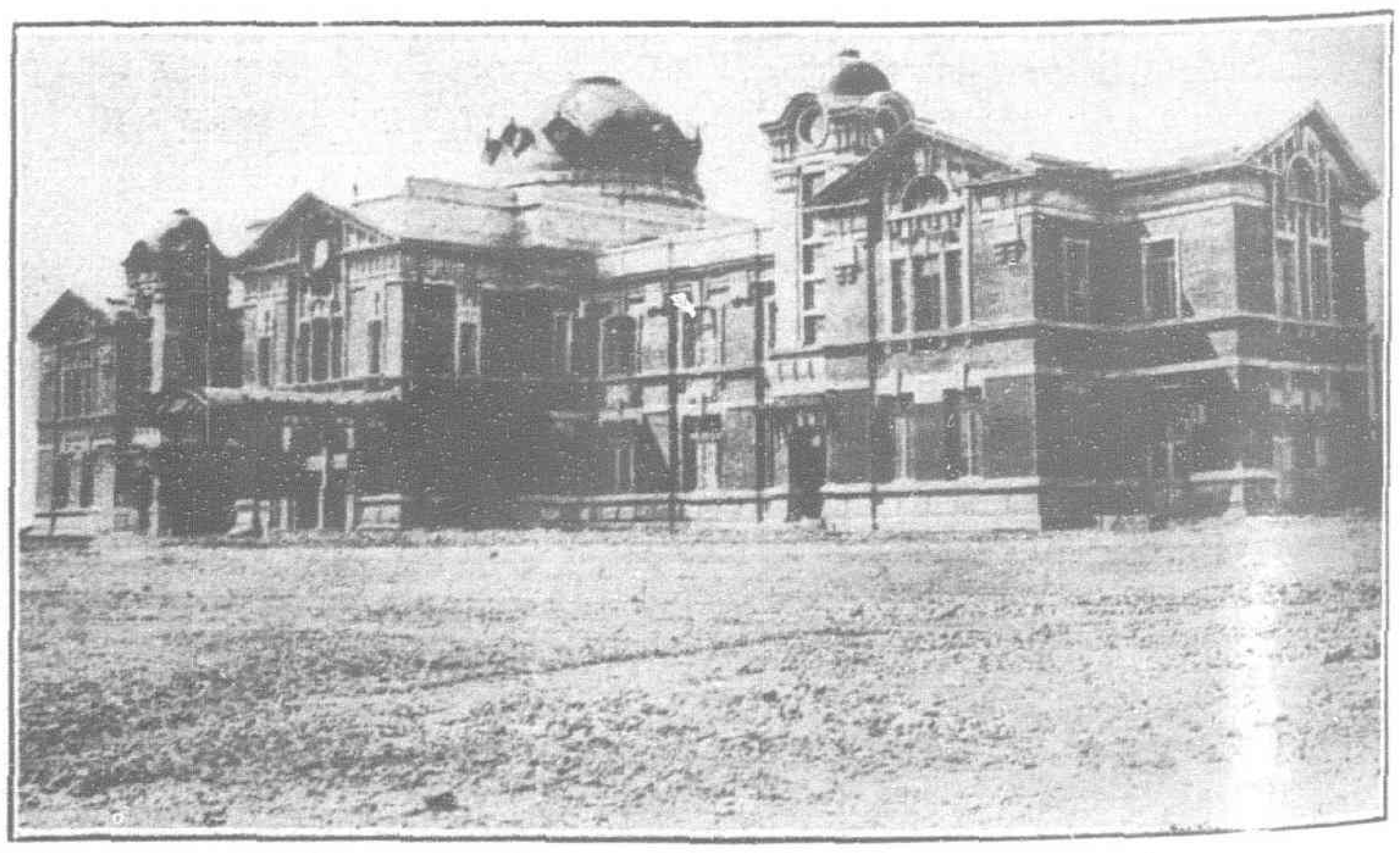
Then, what became of the remaining 63 per cent.—or 1,250,000 tons? They were consumed in oil factories called by the Manchurians "Yu-Fang"; factories which flourish in Dairen and Yingkou, for the manufacture of oil and cakes. The export of oil reached 140,000 metric tons for the year 1923 and that of bean-cake 1,300,000 tons, the oil being exported mainly to Europe and America and the cake to Japan for fertilizer.

As well be gathered from the foregoing sketch, the transportation of soya beans occupies a significant position in the railroad traffic in Manchurian regions.

As peculiar to the method of transporting soya beans now in force on the South Manchuria railway (also on the Chinese Eastern railway, in so far as through traffic to the South Manchuria railway is concerned) attention must be called to the "mixed storage system" which is combined with the carriage. Not only has improvement in handling soya beans been effected but improvement of quality has also, through this system, been encouraged and at the same time merchandising has been facilitated. This system is not at all compulsory and those who do not desire to avail themselves of it can make shipments on the ordinary basis of transportation. But, in reality, the soya bean business derives many advantages and much benefit from the system, especially at a time of congestion of



The Business Street in Mukden



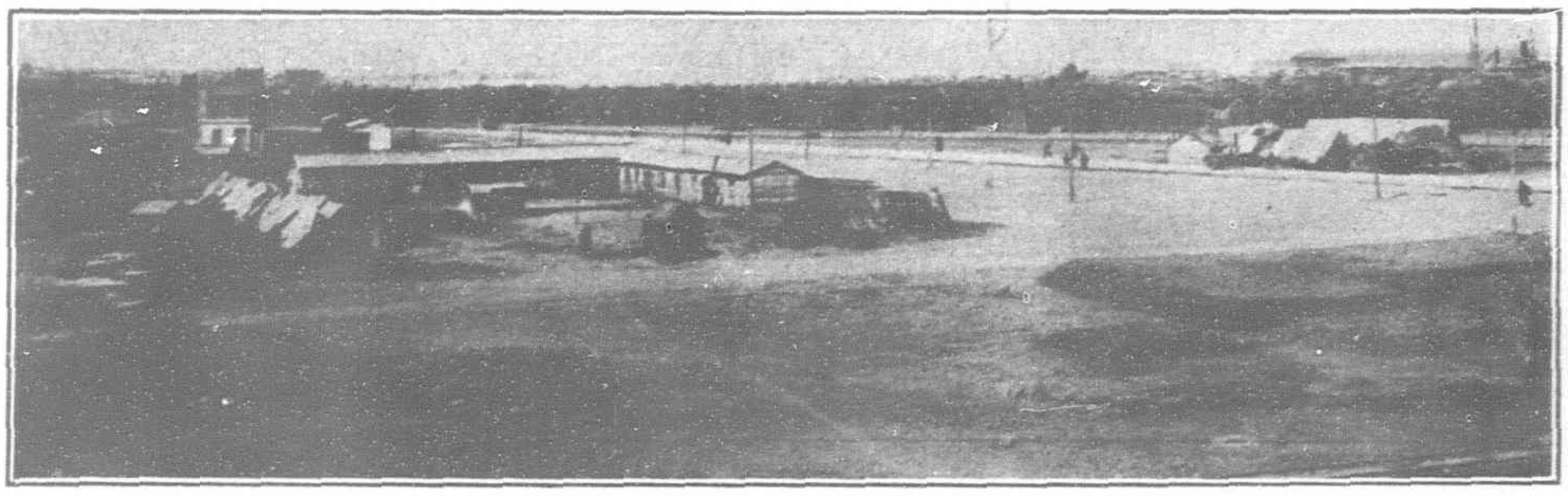
Mukden Railway Station

traffic. Ninety per cent. of the carload shipments utilize the system.

What is, then, the character of this mixed storage system and what functions does it play in the sphere of railroad transportation ?

Mixed Storage System Now in Operation on Railroads

Merchants who are desirous of shipping their beans by rail from one place to another, some for the purpose of discharging their contracts, others for the purpose of supplying their mills with beans purchased for their plants at distant markets, can bring them in bags to specific depots designated as points of acceptance for carriage on the mixed storage basis and there offer them as mixed storage railroad freight. The quantity of one consignment is fixed at carload shipment—that is, about 30 tons, otherwise they cannot be accepted.



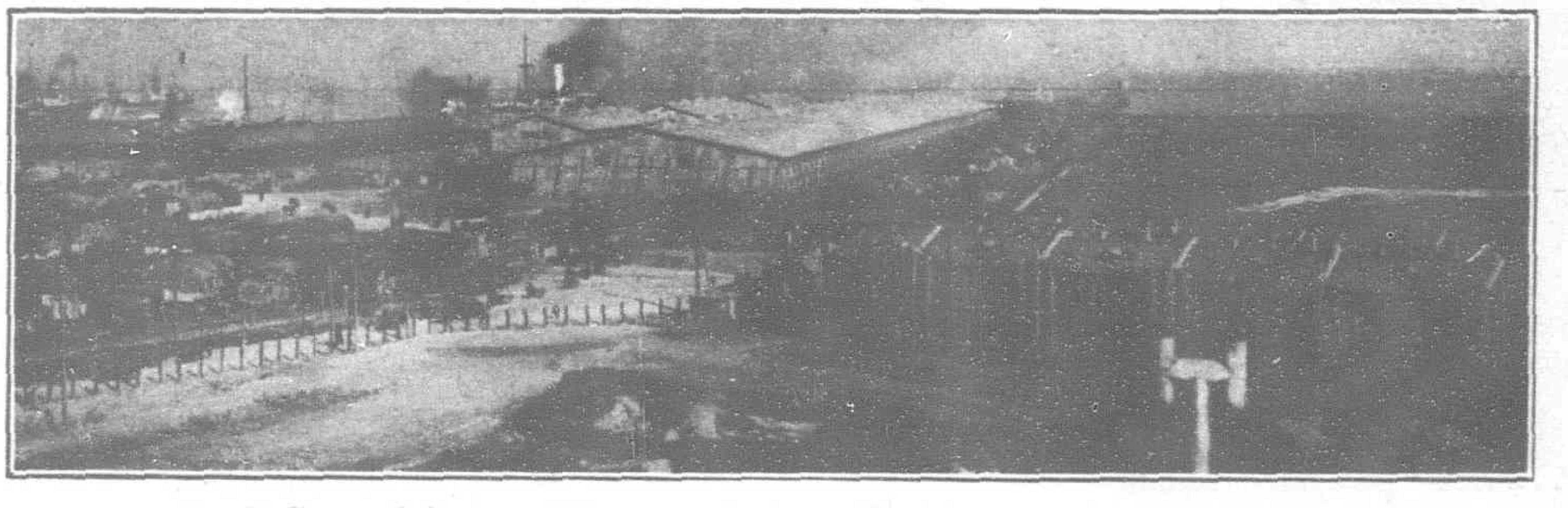
Acres of Bean Cake stored in the Open on Dairen Wharves

Previous to the acceptance the beans thus delivered are examined and graded by railroad agents appointed specially for this purpose, according to standards selected for the year. In addition to the examination and grading of contents, the containers (all of them are gunny-bags) are similarly examined and graded in accordance with the standards fixed for the year. In case the beans offered in this manner come up to the standard and the bags pass examination, they are accepted for storage with transportation. Depositors, who, in a sense, may be called consignors, are entitled to certificates issued on demand, which may circulate legally as negotiable paper. After an interval of a week, reckoning from the day on which the certificates were issued, the bearers of the certificates are entitled on demand to withdraw an equivalent amount of beans of the same quality from the specific depots to which the first depositor has made assignment. But, if they desire to change the depot at the time of the consignment to another, from which they had intended to draw, they are allowed with some restrictions to do so.

Through this system, even when congestion of traffic is experienced, the railroad can operate its rolling stock smoothly and efficiently, by taking into consideration the situation of delivery and withdrawals of beans over all its lines and appropriately adjusting their transportation to meet requirements of any of the depots, irrespective of the specific destinations designated in the consignment papers. This benefits not only the railroad but also consignors and consignees, because carriage will not be refused on the plea that traffic is too congested.

Through this system, improvement in quality of beans is believed to have been achieved. Examiners are vested with the right to determine whether the quality of beans is equal to the standards or not, and the beans which do not come up to the mark do not enjoy the benefit of the system, with the result that merchants do not care to purchase such inferior beans and accordingly farmers pay keen attention to producing beans of superior quality.

Besides these merits the mixed storage system is said to have another beneficial point. Regardless of the real carriage of any particular beans which are entrusted to the railroads, the bearers of certificates are given the right to make withdrawals after the lapse of a certain period of time. For this reason they are able easily to negotiate the papers with banks.



Small Part of Dairen Wharves showing Warehouses and Open Storage

The "mixed storage system," as the railroad authorities call it, was adopted in 1919, by the South Manchuria Railway. Later, in 1922, an agreement was made relating to the through traffic in soya beans accepted on the mixed storage basis between the South Manchuria Railway and the Chinese Eastern Railway.

In view of the economic situation of Manchuria, the South Manchuria Railway donates a bounty of 15 yen per consignment, that is, per carload, and by this means and others is endeavoring to improve the bean trade in its territory.

Examiners. Contrary to that of other countries, the system adopted by the South Manchurian Railway is peculiar in respect to the examiners. Thus in Canada and the United States the examination and grading of grain are usually undertaken by officially organized boards or committees. However, the examination and grading is done on the South Manchurian Railway by examiners appointed by the company. Their qualifications are in like manner determined by the company, which undertakes not merely the responsibility of carrying but also of examining and grading.

Examination and Grading of Soya Beans and Bags. The examination of beans is ordinarily carried on in the railroad yards by drawing a certain number of samples from one consignment which comprises 350 bags, each bag weighing not less than about 85.2 klgs. (142 kins). The method now in use is practical, based upon the appearance of the beans to the naked eye and their moisture content as estimated by chewing between the teeth. The authorities have under consideration the introduction of a more scientific method by which all the complaints arising from the examination and grading will be eliminated.

The standards are fixed at a certain time of the year annually by experts in agriculture at the agricultural experimental station of the company, who collect beans from different parts of Manchuria and take into consideration many conditions necessary to the standardization. The standards now in operation have three grades, A.B.C. Beans which come below C are not to be accepted as freight under the mixed storage system. So far for the beans. I will now give an outline of the examination and grading of bags. Bags used as containers of soya beans are gunny-bags, mostly imported from India—needless to say, some are imported from Japan. The annual import reaches 20,000,000 bags on the average, comprising, of course, old ones as well as new.

The bags in which beans are packed are examined and graded together with the beans. The standards thereof are also three. A new one is designated as A and old one used only once is designated as B, while an old one used twice is designated as C.

The railroad can make delivery of different grades of bags so long as it delivers beans of the same quality as it had accepted. The difference between the prices of superior and inferior grades of bags is paid or received by the company as the case may be.

Method of Packing Soya Beans and the Projected Elevator System. Soya beans are at present carried in Manchuria in gunny-bags and, as the weather in Manchuria in winter when the beans appear on the markets is dry, any precipitation falling as snow, open stacking is permissible without the slightest damage to the goods. But in view of the saving of time in handling the goods, as well as of economising the expenditure on bags the South Manchuria Railway is now considering the construction of grain elevators in the interior as well as terminals, as, for instance, in Dairen and Changchun.

This plan will be realized next year and building will be started.

New Dry Dock of Kiangnan Dockyard

THE large new dry dock of the Kiangnan Dock and Engineering Works, which had been under construction for sixteen months, was officially opened for service last month.

The new dock has been placed parallel to the old dock, leaving a space of about 150-ft. dividing the two docks, on which the pump houses for both docks are situated, also power house and other buildings for the use of the vessels using the docks.

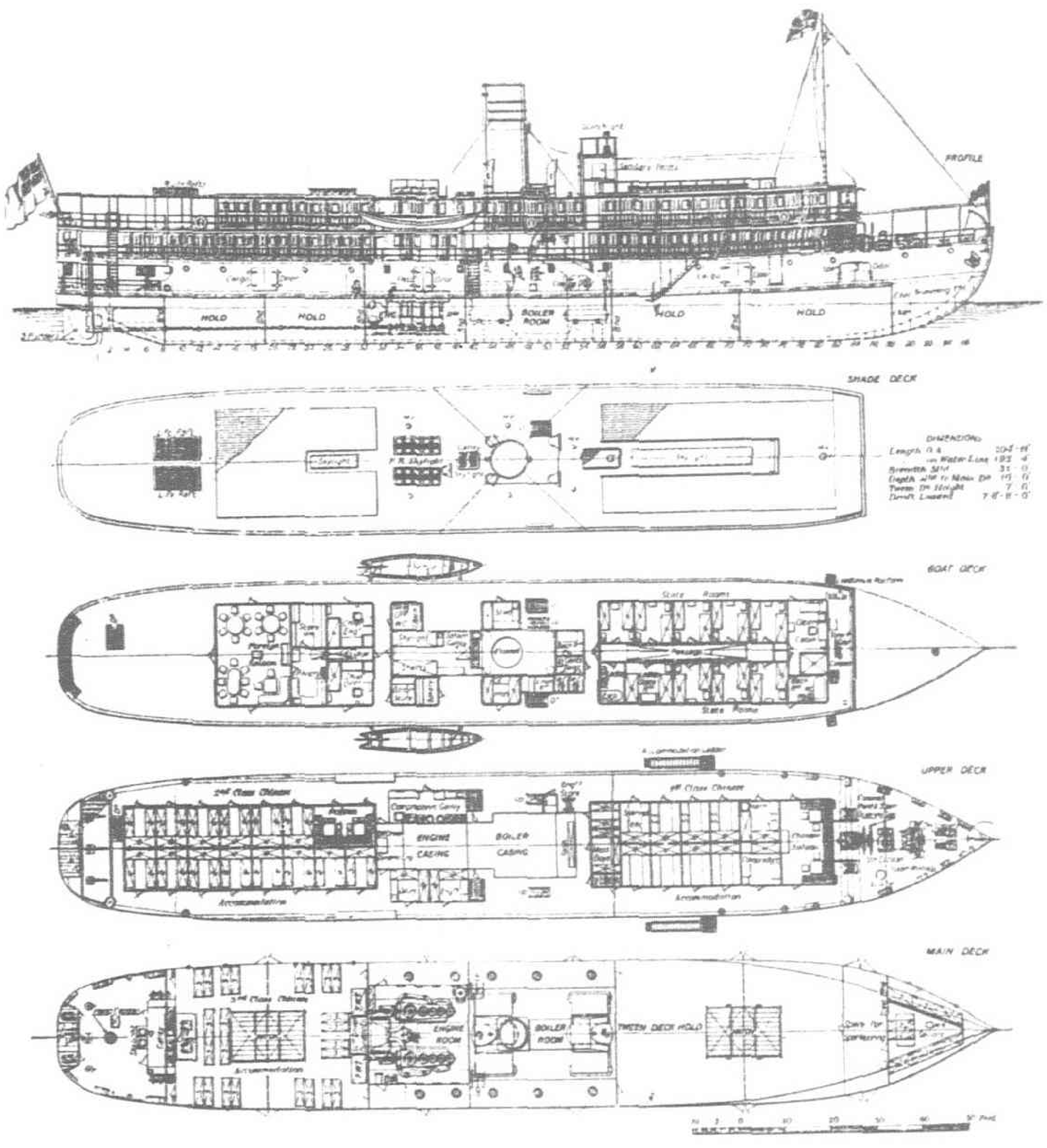
The first vessel to enter the new dock was the "Liberator," 11,713 tons displacement, 428-ft. long and 56-ft. beam. The operation of placing this large vessel in the dock was accomplished in a very short space of time, as two electrically driven capstans placed on each side of the dock, quickly warped the vessel into a central position.

The steel caisson closing the entrance to the dock was floated into position and in a few minutes after being placed was rapidly sunk into the recess for its reception and the order was given to start the dock pumps.

It was soon evident that the pumping plant was of large capacity as the water in the dock was falling at a very rapid rate, and within a few minutes the "Liberator" was resting on the blocks and about sixteen wood shores were wedged up to keep the vessel upright as the water receded and left the vessel dry.

The dimensions of the new dock are 502-ft. long, 60-ft. wide and 26-ft. 6-in. deep. The pumping plant consists of one 30-in., one 20-in. and one 10-in. electrically driven centrifugal pumps. All running together, the dock can be pumped dry without any vessel in the dock in about two hours.

In the docking of the 11,700-ton "Liberator," the 30-in. pump was not required, the two smaller pumps being sufficiently powerful to deal with the water to be discharged.



Shallow-Draught Steamer *Loongmow*, for service on the Upper Yangtze River, China, Built and engined by the Kiangnan Dock & Engineering Works, Shanghai

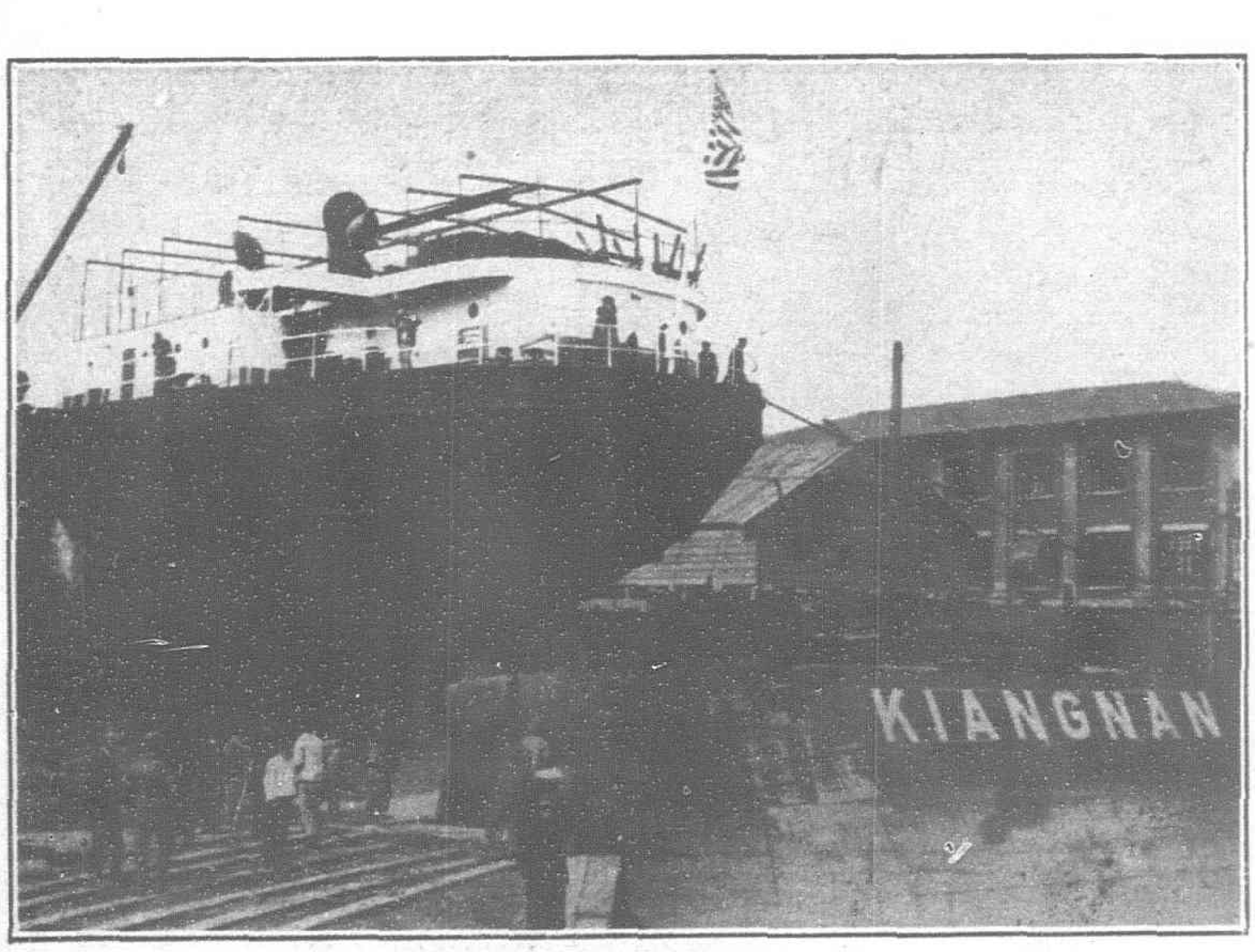
The general construction of the dock is of timber, imported from Canada and the Philippine Islands. The only concrete work visible is at the bottom of the pier heads behind the large steel caisson, which most effectively shuts out the river, with practically no leakage.

The whole structure of the dock is heavy and substantial looking and gives the impression at once as being imposing and a great engineering achievement, reflecting the very highest credit on the designer, Mr. R. B. Mauchan, the general manager of the Kiangnan Works.

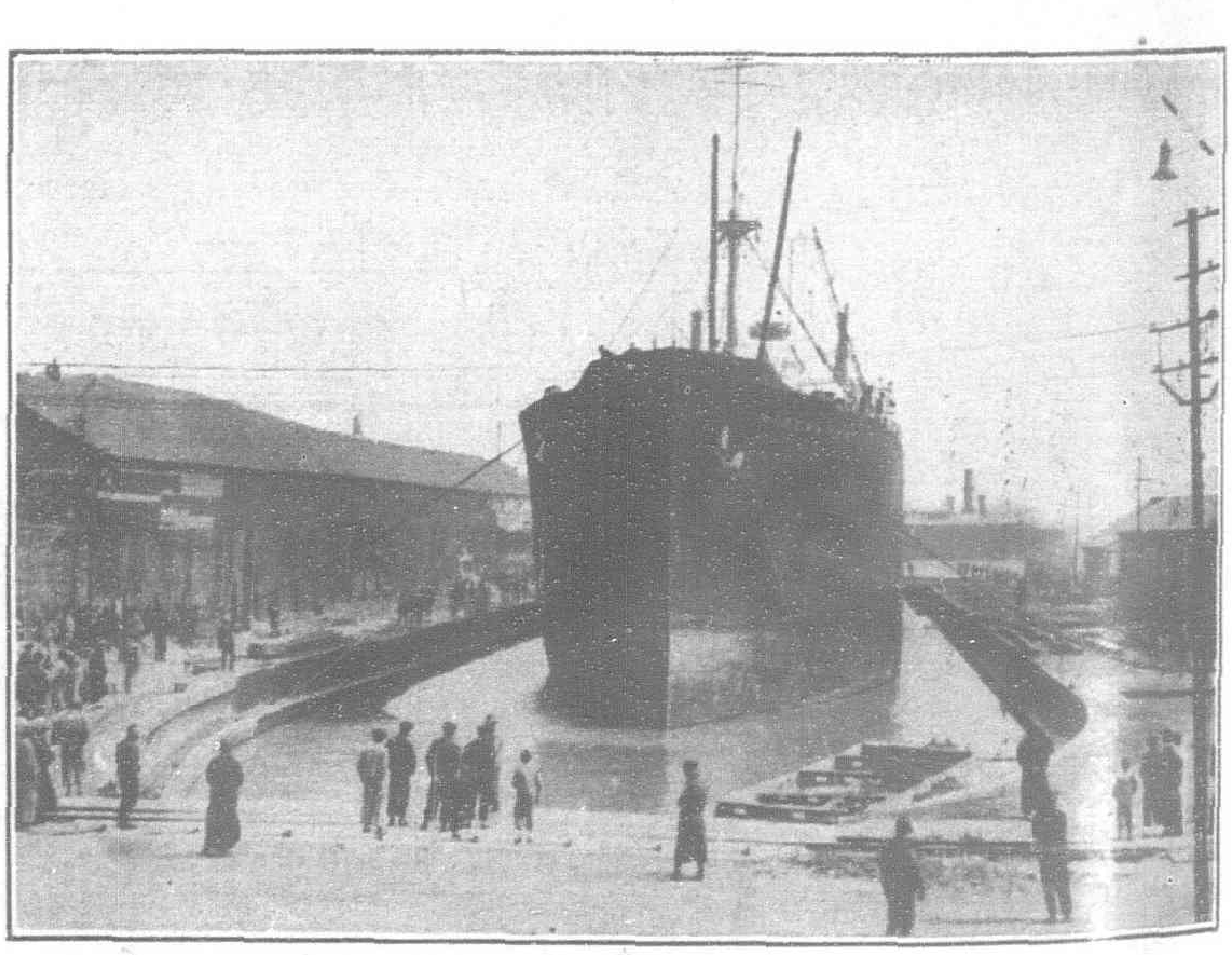
The Kiangnan Works is now in a most enviable position, having two dry docks, and probably the best equipped plant in this part of the world, at the disposal of their many clients.

The dimensions of the docks are: Old dock, 545-ft. on blocks, 60-ft. wide, 20-ft. draft: new dock, 502-ft. on blocks, 60-ft. wide, 23-ft. draft.

The dockyards came into existence about seventeen years ago. There was a so-called drydock which was little more than a mud-hole, no machine shops and no building slips. The yard was supposed to be able to deal with the vessels of the Chinese Navy, but all repairs to Chinese warships had to be carried out in the British yards at Shanghai or Hongkong. In 1905, the Admiral in command of the Chinese Navy came to the conclusion that it was the height of absurdity that a country which had a Navy should not have a dockyard in which to repair its own ships. This was Admiral Yeh, who had been educated and trained in the British Navy, and he set to work to organize the Kiangnan Dockyard. It was a formidable task, but Admiral Yeh was a man of great courage, and regarded his country's interests as his own. He also had the great gift of being able to choose his men, and, having chosen them, he allowed them a free hand,



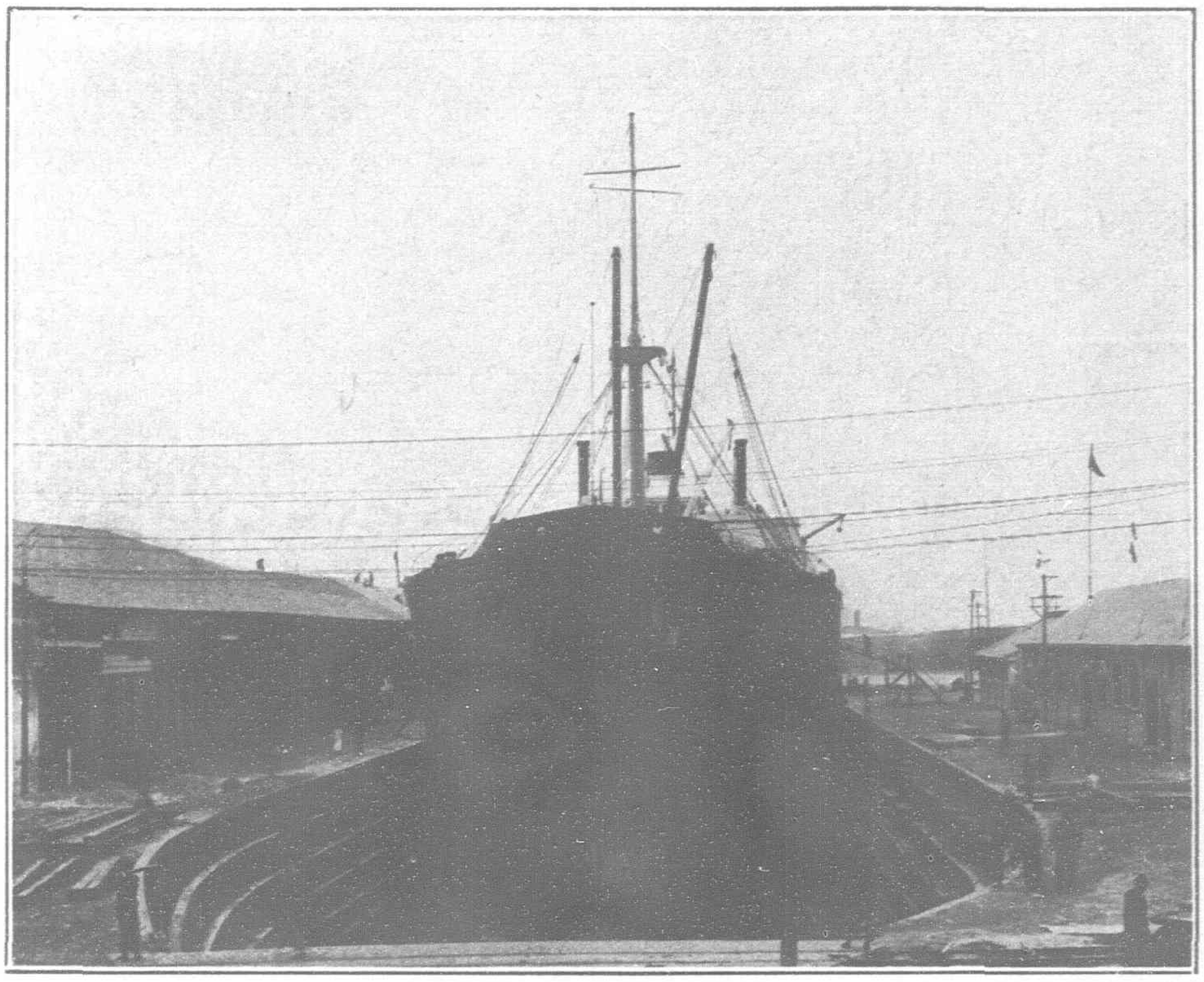
"Caisson" being Put into Position



The "Liberator" Coming into Dock

so long as they carried out the work which was allotted to them. As a director of the yard the Admiral appointed Captain Woo, who had also had considerable Western experience, and Mr. R. B. Mauchan was appointed superintendent.

Mr. Mauchan had received his training in the yard of Denny and Co. on the Clyde, and had had several years' experience in the management of Chinese workers. Admiral Yeh, the original directors, and their successors, have consistently supported the efforts of Mr. Mauchan in his endeavours to make the Kiangnan Dockyard what it is to-day—the premier shipyard in China. It is this co-operation between the East and the West which has proved so successful. Without the whole-hearted support of the directors and government officials in Peking, the European staff, from the superintendent downwards, could have done very little, and, in their turn the directors have been able to rely upon the loyalty of the European staff. In this there is a lesson to be learned by all foreigners who come to China to develop her natural and industrial resources. It is not only necessary that the foreign staff should be technicians of the highest attainments, but they must have the courage to stand by their opinions, and be able to prove by the quality of their work that they are worthy of the positions they hold. It is this frank recognition by each of the qualities and attainments of the other that has proved so satisfactory in the case of the Kiangnan Dockyard.


The "Liberator" in Dry Dock

From the beginning the dockyard has been run on strictly commercial lines. It has enjoyed no privileges from the government that are not available to any of the foreign yards operating in China. The whole of the material imported for the yard has to pay the usual Customs duty. This is another factor that has tended to put the Kiangnan Dockyard at the head of the industry in China. It has had to justify its existence by financial results. It has the competitive incentive to lead the way in designing and workmanship, and has to its credit some special types of vessels that have not been attempted by other shipyards in China.

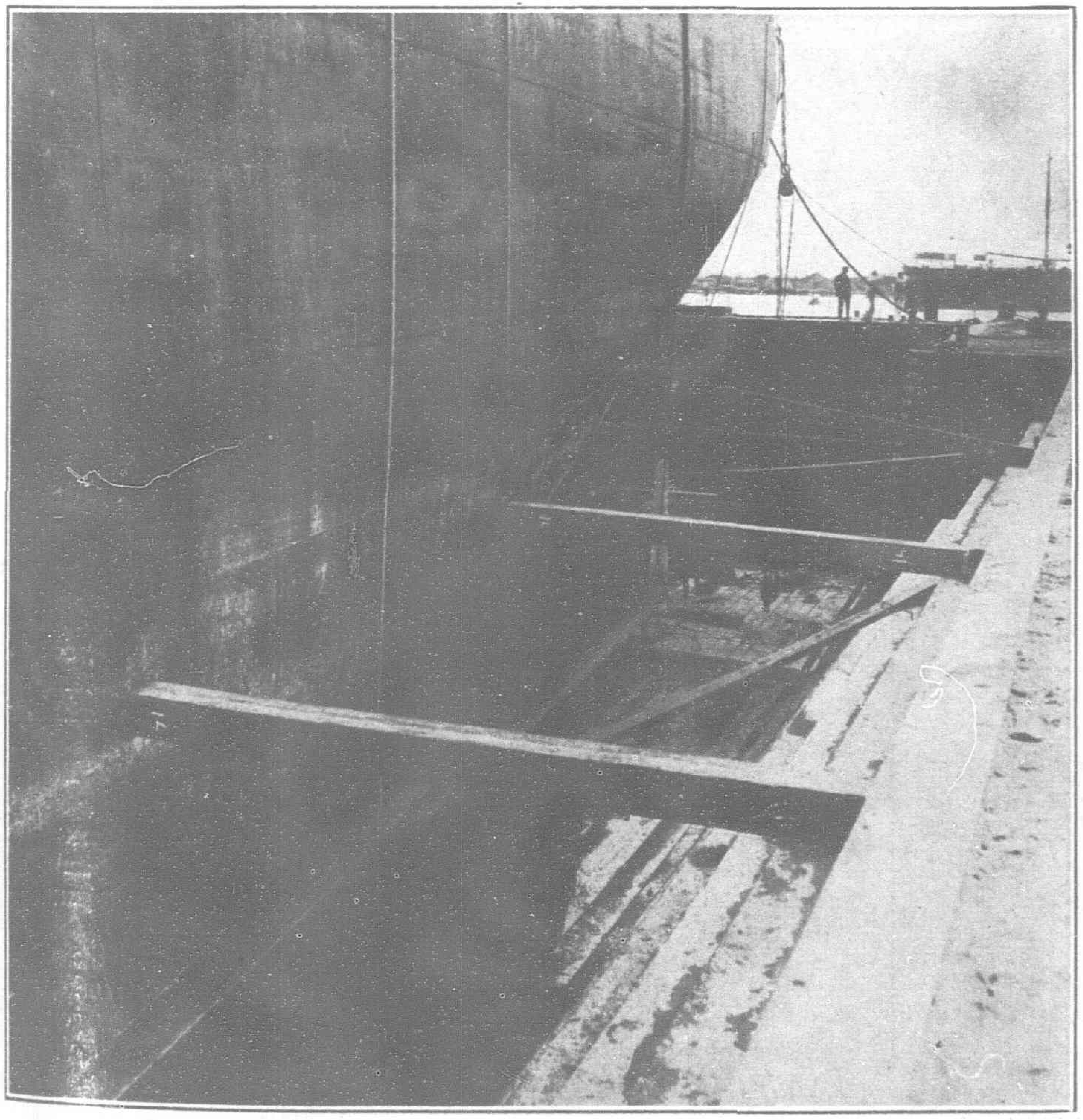
The yard covers an area of 66 acres, rather more than half of which is occupied by shops, dry dock, etc., and the new extensions will take up a considerable portion of the existing vacant space. As opportunity offers, changes are made with a view to arranging the shops so that the work will always move in the one direction, thus saving time and labor. Starting a tour of the yard we come to the following shops:—

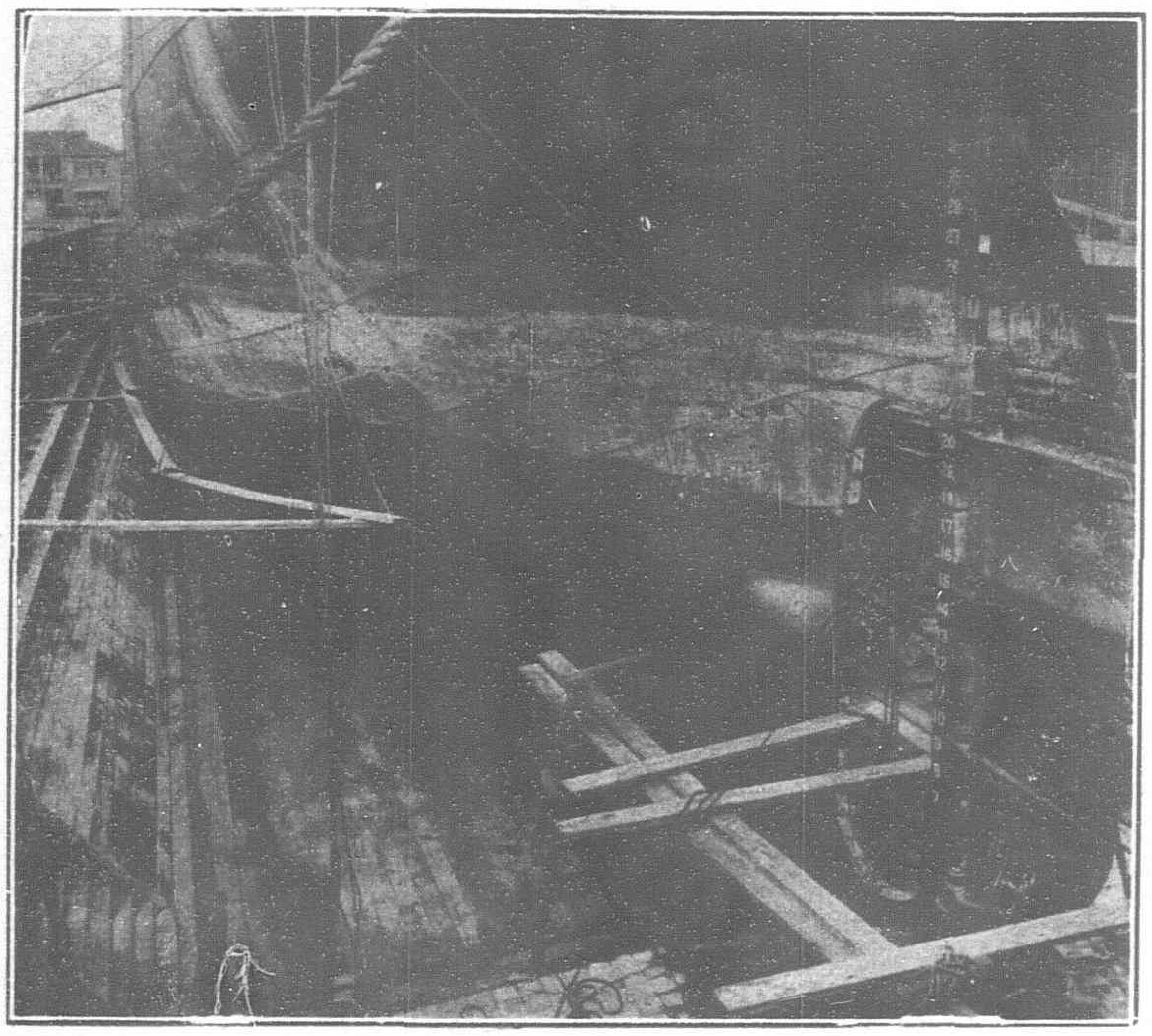
The Pattern Shop is a well-equipped unit of the establishment, adjoining the foundry. It is fitted out with the latest wood-working machinery, and is a well-lighted and spacious shop.

Foundry.—This has been entirely remodelled and re-equipped within the past twelve months, and is now capable of dealing with castings up to twenty-five tons in weight. In view of the nature of the soil, special care has had to be taken to guard against subsidence in dealing with the heavier castings. The casting pits are built of reinforced concrete floated on the mud, thus guarding against movement. The cupolas are so arranged that they are capable of serving pits on either side. Visitors who have had foundry experience in Europe or America have always expressed surprise at the quality of the castings turned out here. An electric steel furnace is being installed and this will be the first of its kind in China.

Machine Shop.—This building is 440-ft. long, 65-ft. wide, and 24-ft. high, and is served by two 20 and one 10-ton overhead cranes. The machine tools are the largest to be seen in China, and comprise some of the latest British types. This shop is capable of dealing with the largest forging or casting likely to be required by the yard.

Erecting Shop.—This leads out of the machine shop. The frame work is steel throughout, with glass sides. It is 180-ft. long, 143-ft. wide, and is 36-ft. high, clear of the cranes. It is served by one 40-ton and two 20-ton


The "Liberator" in Dock, Looking to Caisson



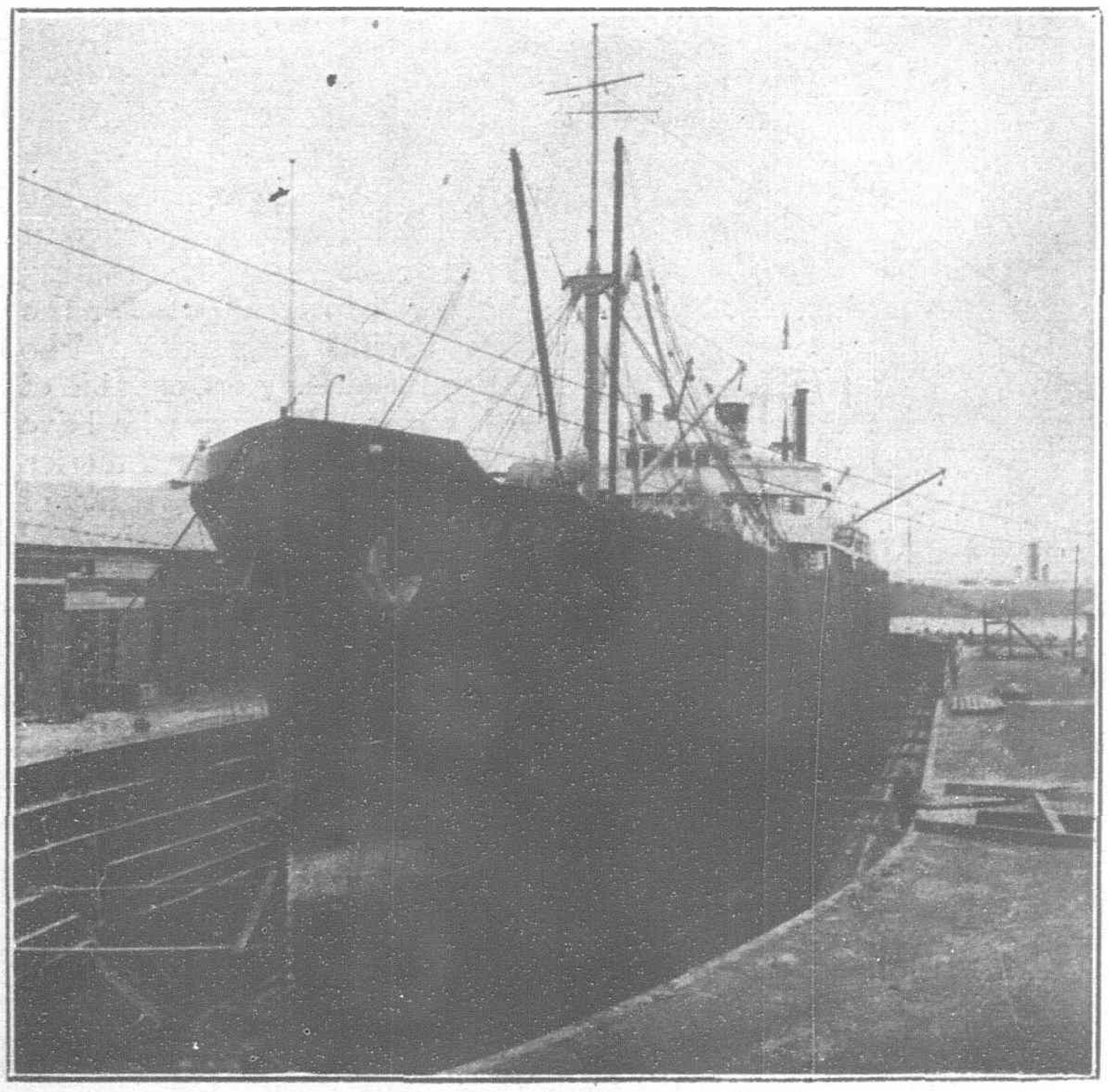
"Liberator" in Dock, Taken from Caisson

overhead cranes. Two of the largest drilling machines, by British makers, have recently been installed in this shop to be driven by electricity.

The Fitting Out Berth is at the head of the erecting shop, and is equipped with sheer-legs capable of lifting 75 tons. These sheer legs formerly stood at the other extremity of the dockyard, and were then only capable of lifting 40 tons. They were taken down, lengthened and re-erected on their present sites.

Dry Dock.—This marks the successive stages of the growth of the yard. It has been lengthened and widened from time to time to meet the growing demands, and is now 545-ft. long, and can dock vessels up to 60-ft. beam, and drawing 20-ft. of water. A new pumping plant has recently been ordered from Gwynne & Co., to deal with the increased size of the dock. A new dry dock is to be built, and work on this is to be commenced this month.

Boiler Shop.—This is the last item in the establishment to be reorganized. An entirely new shop is to be built, and the steel work for it has been ordered from Great Britain.



"Liberator' Dry in Dock on Blocks

Adjoining the building berths are extensive shops for handling the plates and sections used in the yard. These are equipped with the latest types of plate and angle-bending rolls, punching and shearing machines, etc., all driven by electrical machinery.

Slipways.—There are nine large slipways and several smaller ones for dealing with small harbor and other craft. Three slips are available for ships 600-ft. long ; three for ships of 500-ft., and three for ships of 350-ft.

It will be seen from the above that, even judged by home standards, the Kiangnan Dockyard is an establishment of which China may be proud. If China can provide such a yard with locally-produced supplies of iron and steel there is no reason why this yard should not be capable of dealing with vessels of the best class. The Kiangnan Dockyard has built some very fine vessels for the Upper Yangtze services, and, in turning out the ships for the United States Shipping Board she at once takes her place in the forefront of Far Eastern shipyards. Those British manufacturers interested in iron, steel, and shipbuilding, who are looking to China as a field for their enterprise, might do worse than consider a scheme of co-operation with the Kiangnan Dockyard. It would bring together the best in the industrial elements of the two countries, and help considerably in that development of China to which all far-sighted Britons in that country look for the expansion of the trade of the two countries. In any such scheme, providing it safeguards the interests of both parties, British manufacturers may be assured that they will receive the cordial assistance of the present directors, Admiral Wong and Admiral Kwong, and of the general superintendent, Mr. Mauchan. These gentlemen have only one object in their minds in regard to the dockyard—the advancement of the interests of China in the industrial field with the help and good will of Great Britain, to the mutual advantage of both countries.

A New Holt Liner

The twin-screw steamer *Antenor* built at the Jarrow ship yard of Palmers' Shipbuilding and Iron Co., Ltd., to the order of Messrs. Alfred Holt & Co., was taken to sea on Thursday, January 15, for her trial trip. The *Antenor* is a large passenger and cargo liner and has been built to Messrs. Holt's special class and construction, and is fitted with two sets of Parsons steam turbines, built by the Palmer Company. The trial was in every way highly satisfactory, the turbines and gearing running smoothly, and there was complete absence of vibration. On the conclusion of the trial the vessel was handed over to her owners, and sailed thereafter for Glasgow from which port she will make her maiden voyage to the Orient.

New British India Steamer

The steamer *Queda*, built by Messrs. William Gray & Co., Ltd., of West Hartlepool, to the order of the British India Steam Navigation Co., Ltd., of London, successfully ran her trials on January 5 and 6. The vess elisof the following dimensions :—Length overall, 502-ft. ; bre adth60-ft. 9-inches ; depth moulded 32-ft. 8 inches. She has ample accommodation for a fewp assengers and for officers and crew, is fitted with wireless telegraphy, and has an electric light installation throughout. The outfit includes an ice house for provisions, fresh water distiller, steam windlass, and steering gear aft, with telemotor control in bridge, cellular double bottom, deep ballast tank and fore and aft peak tanks, 19 derricks, fitted on masts and derrick uprights, and one 25-ton derrick, 19 steam winches exhausting into winch condenser.

The propelling machinery supplied by the Central Marine Engine Works of the Builders consists of balanced quadruple enginnes, having four cylinders, 28½, 41, 58½, and 85 inches diameter by 54-inch stroke. The vessel is fitted with five large multitubular boilers working at 225 lbs., pressure, and working in conjunction with Howden's system of forced draught.

A number of "CMEW" steamship auxiliaries of the well-known type, also made by the Central Marine Engine Works, are fitted, including centrifugal pump, pair of main feed pumps, general service pump, fresh water pump, harbor feed pump, ash ejector pump, auxiliary condenser circulating pump, direct contact feed heater, evaporator and combined auxiliary condenser, and auxiliary surface feed water heater.

Agricultural Experiment Station in Java

By Dr. P. J. S. Cramer, Director, Experiment Station, Department of Agriculture, Buitenzorg

Before the Pan-Pacific Food Conservation Conference

IN describing the agricultural extension work in Java it must be kept in mind that our stations serve two different kinds of agriculturists. We have one system of production on a large plantation scale, each unit comprising several thousand acres. The native laborer on these plantations is more or less in the same position as the industrial laborer in the United States. He is simply the hand laborer, and the policies of the plantation are determined by Europeans or foreigners. The plantations aim to produce for the world market and the local consumption is quite secondary. Taking our largest plantation crop, sugar, we export 1,600,000 tons, while we use in Java something like 150 thousand tons a year. The export trade is the principal purpose of the industry. We have no manufacturing industry, as in the United States, raw material being sold to the world's markets.

Then on the other hand we have the native agriculture which is done on small farms, largely devoted to the growing of foodstuffs and the necessities of daily life. It is the agriculture which a century ago was able to provide nearly all the wants of the natives. However, in late years the contact of the native with the commerce of the outside world, the building of railroads, etc., has caused a tendency among the natives to also produce articles for the world's markets and we see in the year 1922 that while our large plantation exports were valued at something over $200,000, the value of the exports of the natives from their small farm units was $65,000,000, which is about the value of the sugar crop in Hawaii. It shows the tendency to develop the commercial side of agriculture, which seems to be the more profitable.

I shall explain also our situation with regard to research and extension work. With these two different kinds of production systems, it is clear that each needs its own type of research institution and its own way of running them. Our large plantations have organized their own experiment stations. Our sugar people have one of the largest and oldest experiment stations in the world, more than double the size of the sugar experiment station in Hawaii, and they have done some very excellent work. It is much on the same basis as the sugar experiment station in Hawaii. It is entirely kept up by the money of the companies who have invested capital in the sugar industry there. It is not directed by the planters themselves but rather by the banks which own the sugar plantations. In the rubber industry we have the same situation, and for the other industries much the same. We have a sugar experiment station in east Java and two rubber experiment stations in west Java we have one for coffee and one for tobacco, as well as one for tea. So we also find in Sumatra one for tobacco, and, independent of this, one for rubber and oil palms and for the other crops being developed there which seem promising for Sumatra. While these are absolutely independent and have nothing to do with each other so far as their finances are concerned, there is a mutual understanding between the staffs of all these stations; they meet once a year and talk over their respective interests and exchange ideas for the mutual benefit of each other.

Apart from this whole organization of private stations, we have an Agricultural Department very much like your Federal Department. It tries to fill the gap between the local experiment stations. There are five main divisions: (1) abstract or pure science; (2) general applied science; (3) special applied science; (4) extension work; (5) the farmer and his welfare. In our experiment stations are special men who are located in the centre of the various sugar districts and report on the work done.

In our work for the natives the greatest difficulty is the extension work. It is much more difficult to advise the native than the European planter. The latter receives everything with open hands from the experiment station and hastens to follow the advice. The difficulty is to get the native farmer to practice better methods of production. I could cite examples to show you how superstitious the native farmer is. It requires a good deal of study to understand their mentality. They would rather do less work than improve their crops and get a larger production if it gives more trouble. It makes it extremely difficult for us, therefore, to get the farmers to use better farming methods. We have in every province of Java one trained agriculturist, generally trained in our agricultural high school in Holland. He has to pass an examination in the native languages and have a knowledge of native institutions. These men have done a great deal of work even though it is only the beginning of what we hope eventually to do for the natives.

Steel Works for Shansi

A program for starting two machine shops in Shansi province outlined by the Shansi officials was passed at the industrial conference held in Taiyuan in February. The object is to manufacture different kinds of light machinery for such native industries as paper and oil manufacturing, liquor brewing, etc. and also to turn out improved agricultural implements for the farmers. The program covers two periods. In the first period, the Yu Tsai or Training Machine Shop is to be established at an estimated cost of $194,800. This institution, though working on a limited scale, is to lay the foundation for a larger establishment. It is to study the various kinds of simple machinery which suit the needs of present industrial conditions in Shansi and also to train skilled mechanics for the Ching Tsi or Economic Machine Shop to be organized in the second period. The Ching Tsi Machine shop is to be on a considerably larger scale, its initial cost being estimated at $1,080,000. It is to turn out machinery in adequate amount to supply local needs. The object is not to make profits but to increase the productive power of the people, and the plan is to sell the output at less than the market price so as to bring labor-saving devices within the reach of the inhabitants of even the most economically backward districts. The Ching Tsi Machine Shop, when working to capacity, will turn out ten sets of hand-working machinery a day. According to this ambitious schedule of the authorities, it will take 30 years for the plant to turn out enough machines to meet the bare needs of the whole province, allowing ten sets for each village. (There are over 10,000 villages in the province). The Yu Tsai Machine Shop which is being organized, will be an experimental undertaking, and the authorities will carry out the latter part of their program if the results of the Yu Tsai Machine Shop warrant it.

In this connection Shansi authorities have also planned to establish two steel refining plants, one to be known as the Yu Tsai or Training Steel Plant and the other, Ching Tsi or Economic Steel Plant. The nature of these establishments is similar to that of the machine shops referred to above. This program also covers two periods. In the first period only experimental work will be attempted, estimated to cost $236,000 for the Yu Tsai Steel Plant and about $1,175,000 for the other. According to the estimate of the Shansi officials, a ton of steel turned out locally will cost about $40 as compared with $100 which now has to be paid for the same quantity of imported steel. The abundance of coal and iron mines in the province will greatly cheapen the cost of locally produced steel.

History of Mining in the Philippine Islands

(*Continued from page 206.*)

that the reason for this Filipino attitude is, principally, his lack of knowledge concerning mining. The same condition exists in the United States, where people who are engaged in agriculture or other industries show very little or no interest in mining. It takes a man who either has been engaged in mining work most of his life, or has lived in the neighborhood of an active mining district, to appreciate and enjoy the miner's or prospector's work and to entertain constant hopes for some success. This is illustrated in the Philippines in all the districts where some kind of mining has been done. However, most of the people benefited are illiterate, and are obliged to do what they have seen done, modified only perhaps by their personal experiences, because they are not able to acquire the knowledge requisite for advancement. The many failures of the pioneer Spanish and American activities are perhaps responsible for giving the Filipinos a somewhat distorted idea and distrust of the mining industry.

The Oriental Development Company in Korea

(*Continued from page 210*)

Fiscal year	Time redemption		Annual redemption		Total	
	Accounts		Accounts		Accounts	
1909 ..	17	Y. 221,900.00	—	—	17	221,900.00
1910 ..	126	429,730.00	6	157,800.00	132	587,530.00
1911 ..	210	514,369.76	57	623,100.00	267	1,137,469.76
1912 ..	314	925,147.43	132	1,476,678.82	446	2,401,826.25
1913 ..	791	1,245,668.35	272	2,457,022.07	1,063	3,909,690.42
1914 ..	1,032	1,667,962.36	603	3,604,707.94	1,635	5,272,670.30
1915 ..	1,005	1,441,597.99	977	4,156,878.74	1,982	5,600,476.73
1916 ..	826	1,287,631.56	1,066	4,320,967.02	1,897	5,608,598.58
1917 ..	600	1,621,274.74	1,462	6,646,287.19	2,062	8,267,561.93
1918 ..	745	3,486,638.98	2,668	13,981,238.51	3,413	17,467,877.49
1919 ..	1,302	6,754,593.44	5,126	24,660,574.81	6,408	31,415,168.25
1920 ..	1,443	7,953,291.83	5,754	28,558,903.54	7,197	36,512,195.37
1921 ..	1,507	14,344,674.30	5,798	28,992,373.73	7,305	44,337,048.02
1922 ..	1,551	14,485,327.05	5,389	28,968,166.36	6,940	43,453,493.41
1923 ..	1,564	15,009,236.35	5,225	29,705,932.01	6,789	44,715,168.36

The Table showing the Items of Industries for which Loans have been accommodated: September 30, 1923.

Description	Time Number of account	Yen	Annual Number of account	Yen	Total Number of account	Yen
Land improvement and reclamation ..	866	4,141,359.130	3,254	12,874,165.87	4,120	17,015,525.00
Town planning ..	206	1,659,148.590	335	1,977,670.57	541	3,636,819.16
Irrigation enterprise	33	1,160,801.30	116	5,500,043.76	149	6,660,845.06
Agricultural management	211	689,128.18	999	3,582,163.74	1,210	4,271,291.92
Forestry	29	78,271.90	104	541,508.99	133	592,780.89
Ginseng-planting ..	8	106,430.00	23	202,851.54	31	309,281.54
Cotton-planting ..	1	5,000.00	3	11,838.19	4	16,838.19
Tobacco-manuf'ng ..	1	900.00	—	—	1	900.00
Fruit growing ..	24	65,604.60	69	157,392.22	93	222,996.82
Silk-raising	22	110,592.04	114	145,288.05	146	255,880.09
Live-stock breeding..	25	1,159,723.57	8	118,359.56	33	1,278,083.13
Aquatic products industry	7	40,050.00	17	49,176.11	24	89,226.11
Mining	3	954,100.00	44	2,704,339.10	47	3,658,439.10
Paper-milling ..	2	10,600.00	5	17,171.25	7	27,771.25
Flour-milling ..	1	8,000.00	2	4,653.89	3	12,653.89
Rice-milling ..	15	86,980.00	19	173,644.92	34	224,624.92
Ceramic	—	—	6	50,832.93	6	50,832.93
Brewery	5	26,603.66	8	21,578.83	13	48,182.49
Electric and Gas supply	6	4,502,000.00	—	—	6	4,502,000.00
Transportation ..	1	23,000.00	7	129,865.78	8	152,865.78
Various manuf'ng industries	2	15,000.00	4	16,011.83	6	31,011.83
Health	—	—	6	435,147.61	6	435,147.61
Educational ..	2	8,240.00	19	330,411.47	21	338,651.47
Miscellaneous ..	84	157,703.38	63	724,815.80	147	882,519.18
Total .. Yen	1,564	15,009,236.35	5,225	29,705,932.01	6,789	44,715,168.36

Japanese Railway Contracts in England

Several orders were completed last year and a number more are still in progress for multiple unit equipment for various railways in Japan, including the Keihan Railway, Keisei Railway, Nagoya Railway, the Shin Keihan Railway, the Kagamigahara Railway and the Toyokawa Railway.

Steel Railway Bridges for Siam

Tenders are now being called for a number of steel railway bridges for the Siam State Railways, which are returnable by May 15.

Tenders are also being invited for large quantities of steel rails and permanent way accessories for the Siam State Railway.

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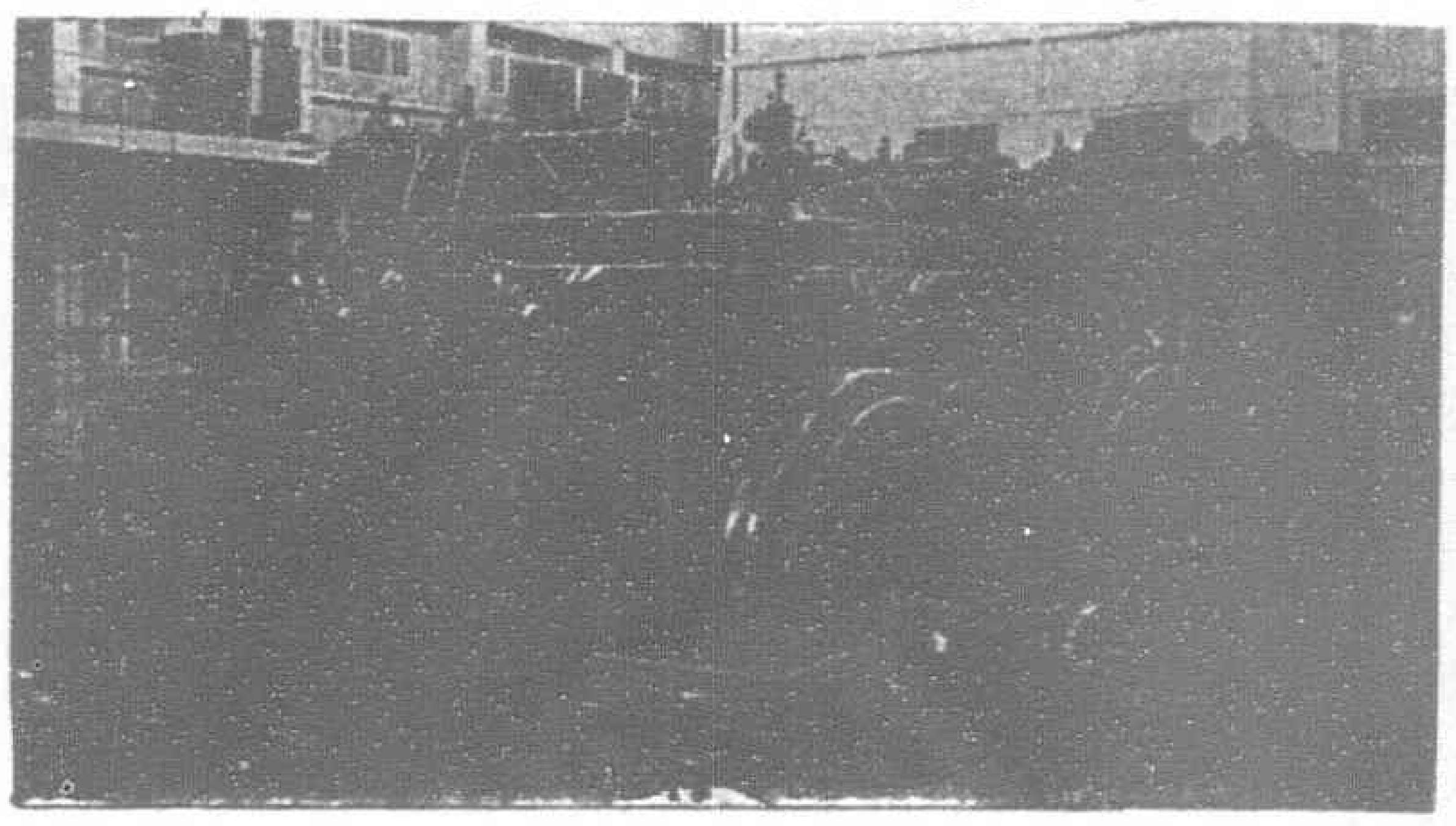

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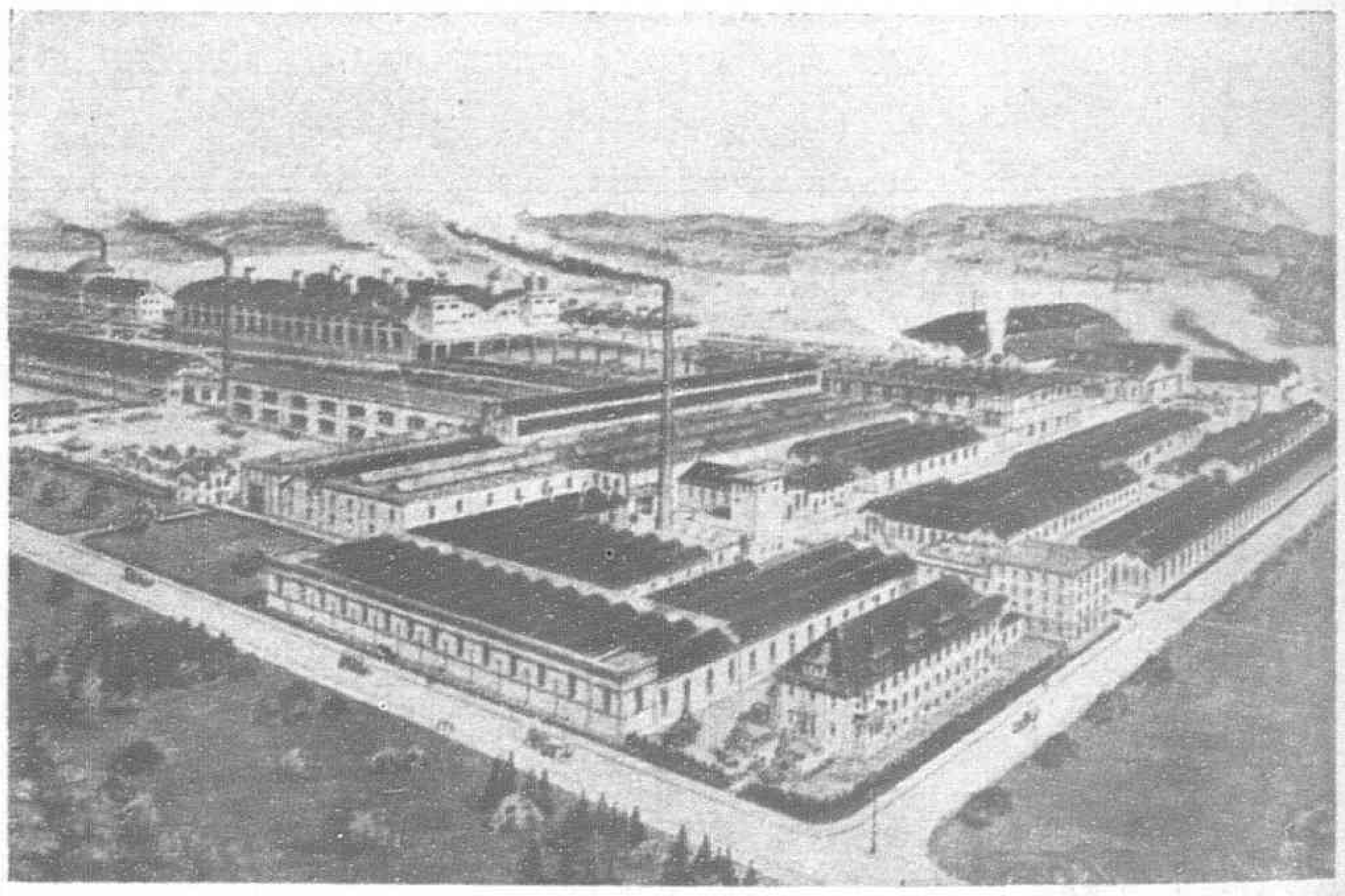

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